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THE

MEDITERRANEAN NATURALIST

A REVIEW OF NATURAL SCIENCE.—PUBLISHED EVERY TWO MONTHS.

EDITED BY JOHN H. COOKE, B.Sc., F.G.S.

Assisted by A. CARUANA GATTO, B.A., LL.D.,

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The Mediterranean Naturalist.

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Contents-March.

		PAGE
1	The Fourth allotropic form of Carbon—G. Jervis F.G.S.	331
2	The Natural History of Certain Fevers occurring in the Mediterranean — Capt. M. Louis Hughes A.M.S.	332
3	The latest from Mars	334
4	Meteorological report for 1892	334
5	Geological Notes of Acireale—G. Platania	335
6	Animal Plagues	336
7	*Notes and News:*—	337
8	The Relationships of the Structure of Rocks to the conditions of their formation—Prof. H.J. Johnston Lavis	337
9	The Lands of Volcanoes	340
10	The Geology of Arabia Petrea and Palestine	340
11	The vegetation of the house terraces of Malta—Dr. A. Caruana Gatto	341
12	*Science Gossip:*—	342
13	Monthly Meteorological report	345
14	Correspondence:—Excessive charges	346

Contents-April.

		PAGE
1	The recent Earthquakes in Zante—W. G. Forster	347
2	The Future of the Races	354
3	Variation in Skin Colour	354
4	The Marls and Clays of the Maltese Islands—J. H. Cooke, B.Sc., F.G.S.	355
5	*Science Gossip:*—Earthquake in Sicily—*Helix aspersa* among the Maltese Oranges—Bee stings as a cure for rheumatism—Maltese Figs—The Maltese Dog—The land tortoises of the Galapagos—Natural history of Madagascar, etc. etc.	358
6	The Sandgate Landslip—W. Topley, F.R.S.	360
7	Meteorological Report for the month.	362

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CONTENTS.

		Page
1	La Botanique du Nord-Etbai—E. A. Floyer	363
2	"Falco punicus" in Malta—N. Tagliaferro	366
3	Animal plagues	367
4	The Malta Potato Disease	367
5	The Effect of Pressure in causing a thinning of soft strata—G. J. Burns, B.Sc.	368
6	The Worlds Coal Supply	369
7	On the Slugs of the Maltese Islands—A. Caruana Gatto, B.A., LL.D.	370
8	The Street of Duels	373
9	Diamond making	374
10	The Marls & Clays of the Maltese Islands—John H. Cooke, F.G.S.	374
11	City Dust	378
12	Geological Notes on Acireale—G. Platania	379
13	The Pola Deep Sea Exploration	380
14	On the occurrence of lignite in the *Globigerina* bed of Malta—N. Tagliaferro	380
15	*Science Gossip*:—Do glaciers excavate?—The Peronospera in the Mediterranean—Irrigation—Flies and Cholera—Causes of modern debacles—Maltese Aphididæ and their foes—Origin of stars—Vandalism in Malta—Earthquakes in Malta—Leprosy and fish-diet—A new Botany—Electric farms—Prehistoric music—Survey of Greece—Curious roofs—The forms of eggs—The navigation of the air—A radio-micrometer—The moth as a chemist	381
16	Maltese Meteorology	386

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Important Notice to our Readers.

We desire to inform our readers that is our intention to enlarge the Mediterranean Naturalist, *and, from time to time to illustrate it.*

Instead, however, of publishing every month as heretofore, we shall publish every two months.

La Botanique du Nord-Etbai

par Ernest Ayscoghe Floyer

Exposition d'une théorie (soumise à la critique) d'après laquelle la disparition en Egypte des plantes du désert serait due à l'introduction de l'Arabe et de son chameau.

L'expédition a consacré beaucoup d'attention à la botanique des vallées et des déserts, mais il lui eut fallu de plus grandes peines pour recueillir des spécimens pour un herbier. Après les patients labeurs déployés pendant plus de vingt ans par Ascherson et Schweinfurth, il y avait peu de chance de trouver de nouveaux spécimens, bien que ces éminents botanistes n'eussent pas visité toutes les parties du pays exploré par l'expédition. Une vingtaine de plantes qui ne semblaient point familières ont été toutes identifiées par le professeur Carruthers avec celles de la flore égyptienne. La formation d'un herbier fut donc négligée, et l'attention dirigée vers un autre point. Une caractéristique géographi du pays consiste en une d'environ haute chaîne 2,000 pieds et dont certains pics s'élèvent à 6,000 pieds au-dessus du niveau de la mer. Cette chaîne longe la côte en une pente raide du côté de la mer et douce du côté de la terre.

Les différences très marquées dans les conditions botaniques, de chaque côté de la ligne de partage des eaux, semblaient offrir un libre champ aux découvertes. Il semblait que les pentes raides et relativement humides de l'est pouvaient supporter une végétation différente de celle qui luttait pour l'existence sur les pentes plus sèches situées à l'ouest. Tel aurait dû être le cas. Et le fait qu'il

n'en était pas ainsi ouvrit la voie à une théorie qui va faire l'objet du présent chapitre.

Il est vrai que la plupart du temps, c'est à l'est que l'on trouve le *Calligonum Comosum*; que la tamaris indique une formation calcaire, et que la *Capparis spinosa* existe rarement, sauf dans les crevasses du granit. Cependant il paraît évident que quelque influence universelle s'est fait sentir, rendant uniforme la condition des pentes, et du côté de la mer et du côté de la terre.

Dans les parages pastoraux de l'est, la botanique joue un plus grand rôle et se prête à une étude plus vaste que ne l'indiquent la collection de spécimens ou l'observation des localités.

C'est chez les Arabes, la première chose qu'ils étudient et connaissent avec soin. A elle se rattache la sécurité ou la perte de leurs troupeaux. Cette déclaration ne semblera pas exagérée dès que l'on aura pris connaissance des faits suivants.

Schweinfurth décrit 2,000 spécimens qui auraient été trouvés en Egypte, et dont la plupart sont cultivés dans les jardins. En dehors de cela, il ne reste pas un arbuste, pas une herbe qui n'ait son nom arabe inscrit dans les listes de Schweinfurth. Il est vrai que, parfois, un même nom arabe sert pour indiquer trois ou quatre variétés de la même plante; néanmoins il en résulte rarement de la confusion, mais la chose arrive moins souvent qu'on ne le supposerait.

Schweinfurth a catalogué mille noms donnés par les Arabes aux maigres arbrisseaux parsemés dans leurs plaines, et l'estime qu'ont pour lui ces peuples comme "écrivain des arbres," est bien plus haute que celle accordée à ceux qui étudient les temples et les ruines.

Dans les vallées du nord de l'Etbai,—c'est ainsi que les habitants appellent le pays,—un petit garçon nommera sans hésitation toutes les plantes qu' on pourra lui montrer. Il est vrai que c'est là tout ce qu'il sait. Du jour où il peut marcher, il sort avec les troupeaux et son alphabet consiste dans les noms des arbustes dont ils se nourrissent. Quand il devient plus grand, il suit les chameaux, parcourt géographiquement une plus vaste étendue de pays, et connaît les noms d'une différente classe de plantes.

Il commence alors à voyager, apprend la géographie et devient un excellent géographe. Aux noms botaniques qu'il sait déjà, il ajoute les noms du granit, du grès, de la pierre calcaire, de l'ardoise, du quartz, du mica et de la roche métamorphique, qu'il arrive à distinguer sans erreur; son instruction est alors complète, et, si les mots qu'il connaît pouvaient être classés, il est probable que 50 sur cent seraient reconnus pour être des termes de botanique.

La géographie se compose de cinq noms pour les collines de différentes forme et grandeur, de quatre noms pour les vallées et les ravins.

Une colline assez élevée pour recevoir le nom de Jebel a toujours un Wadi du même nom, et la colline porte généralement le nom de la vallée qui, à son tour, prend celui du principal arbre qui y croît, ou y croissait lorsque le nom fut donné.

Tel est le degré d'union qui existe entre la géographie et la botanique.

Or, l'on remarque, dans la nomenclature des vallées, un fait curieux: c'est à peine si une seule de ces vallées possède l'arbre d'où elle tire son nom. Il n'y a pas de trace, dans le Wadi Miah, de la *Moringa aptera* à l'odeur de foin;—point de *Crotalaria* dans le Wadi Natash;—point d'*Acacia tortilis* dans le Wadi Arreis; — point d'*Acacia spirocarpa* dans le Wadi Somr;—point de *Taberne montana* dans le Wadi Lehema. Ce dernier nom est abyssinien; et l'on doit se rappeler qu'il n'y a que 1200 ans que l'on parle arabe dans ces montagnes. Les Arabes Rabia', qui vinrent ici avec Amr le conquérant, en 640, s'unirent réciproquement avec les pasteurs chamitiques qui erraient entre Massawah et Kosair. Les riverains du Nil connaissaient ces pâtres chamitiques sous le nom générique de Beja, mot qui est probablement le mot kensi pour "extérieurs". Ils étaient des "BARBAROI" pour les habitants de la vallée du Nil. La sous-tribu des Beja, qui était établie le plus au nord, était celle des Bishari, qui parlaient et parlent encore le bishari, langue sœur de la langue abyssinienne. Du mariage mutuel entre les Rabia' et les Bishari, naquit l'Abbadi (pluriel Ababdi), qui habite aujourd'hui le nord de l'Etbai, et chez qui l'élément sémitique est bien plus prononcé que chez le Bishari, race que l'on trouve encore nombreuse vers le sud.

La prédominance de l'élément semitique peut avoir causé la disparition graduelle des noms chamitiques pour les collines et les vallées. Les historiens arabes, qui écrivaient en 800, appellent

la montagne située au sud des mines d'émeraudes, Karkashendah. Aujourd'hui elle porte le nom arabe de Hamata, *Ficus pseudo-sycomorus*, par allusion à sa forme. Et Wadi Lehema, la vallée de la *Taberne montana*, arbre abyssinien, est encore un nom qui a survécu aux jours préislamiques.

Aux endroits où ces vallées traversent du grès tendre il y a par intervalles des masses de rochers ombreux qui, de temps immémorial, ont servi de lieux de repos aux voyageurs. Ces rochers sont partout couverts de grossières figures de vaches, de chevaux, d'archers et de longues files d'autruches. Ces animaux ont tous disparu. L'histoire nous apprend que des corps de cavalerie, composés de trois à quatre cents hommes, parcouraient ces déserts pendant plusieurs mois, sans éprouver aucune difficulté sous le rapport de l'intendance. Cela serait maintenant complètement impossible. Il est survenu dans le pays un grand changement, qui a affecté également les deux côtés de la ligne de partage des eaux. Ce n'est pas une question d'époques géologiques, mais de faits qui se sont passés il y a quelques centaines d'années seulement. Il s'agit de la disparition de ces vallées d'arbres connus encore de nom dans la langue d'un peuple arrivé dans ces vallées il y a environ 1200 ans. Il est possible qu'il y ait eu une période de pluie plus forte qu'à présent. C'est une question que nous avons discutée à sa place, et dont nous n'avons pas à nous occuper en ce moment.

Mais il a été exposé que la disparition des animaux, qui autrefois vivaient ici, et des plantes dont ils se nourrissaient, ne date que de 1200 ans; en effet, les noms des plantes et des animaux perdus survivent dans une langue qui n'a existé dans ces lieux que durant cette periode. Si l'on peut remonter à la cause prèmiere de ce changement complet, on aura, sans aucun doute, largement contribué à la science de la botanique; en outre, les botanistes pourront invoquer cette cause sur de vastes échelles, pour expliquer, par exemple, la disparition de l'encens et des épices de l'Arabie du sud, la présence de milliers de chariots et de cavaliers en Palestine, pour démontrer enfin, comment, dans l'antiquité régnaient une plus grande fertilité et une population plus nombreuse dans bien des pays dont l'histoire, comme celle de la Palestine, ne semble pas en rapport avec l'absence des ressources actuelles.

Il a été provisoirement établi que les Arabes pénétrèrent dans le pays avec la conquête de l'Islam, en l'an 640 du Seigneur.

Bien avant cette date, il y avait parmi les Egyptiens un fort mélange d'élément sémitique. Mais voici d'après quelles bases nous choisissons cette date pour l'argument qui nous occupe. Les Arabes de la conquête étaient les Arabes nomades, propriétaires de chameaux. Ce fut leur établissement dans la vallée du Nil qui permit au chameau de faire avec sûreté une autre étape dans sa marche vers l'ouest.

Le chameau est une propriété presque unique. Il a beaucou de valeur et ne peut être protégé, soit contre les voleurs, soit contre tout autre ennemi. Pour son bien-être, il doit pouvoir circuler en sûreté, sur une vaste étendue de pays, et il constitue à la fois la sécurité et le tendon d'Achille de la tribu qui le possède.

En temps de paix, il nourrit et transporte son propriétaire à de frais pâturages. Mais en temps de guerre, une poignée d'hommes peut, dans une nuit, enlever tout le troupeau.

Ainsi, tant que dans la vallée du Nil, on considéra les Arabes comme les "Maudits Shasu" le chameau fut relégué dans les limites de la Palestine et de l'Arabie.

Il est vrai que le chameau servait, au temps de Ptolémée-Philadelphe, à transporter des marchandises sur la route de Kina-Kosair. Mais un petit nombre de chameaux pouvait suffire à tout le trafic indien de cette époque. Le voyage dure quatre jours. Dix chameaux, faisant un voyage complet tous les quinze jours, pouvaient donc, dans l'espace d'une année, transporter quarante tonnes de marchandises, sur la route de Kina à Kosair, et peut-être la moitié de cette quantité, en suivant la route de Coptos à Bérénice. Ce chiffre semble excessif pour l'importance du commerce Indien, si l'on considère le petit volume des articles qui pouvaient payer le long transport des Indes. Mettez en comparaison les listes, pompeusement inscrites sur les temples, des articles obtenus par un Pharaon dans sa plus glorieuse campagne. En outre, les chameaux n'étaient pas les seules bêtes employées; l'âne conserva longtemps sa place, comme offrant le mode de transport le moins coûteux. Et jusqu'à

ce jour, on se sert des ânes aussi souvent que des chameaux, sur cette route commerciale.

Depuis l'an du Seigneur 640, les propriétaires de chameaux sont établis sur le Nil. Leurs chameaux paissent en sûreté dans les déserts maintenant épuisés. Mais antérieurement à cette époque, ils ne pouvaient se répandre à volonté dans le pays. Ils ne pouvaient trouver aucune longue période de sûreté. Il semble probable que, pour les transports, quelques chameaux étaient amenés par des hommes hardis déterminés à lutter pour les défendre, mais que les chameaux étalons restaient toujours en Arabie.

Les recherches de Ritter sur l'extension graduelle du chameau hors de sa patrie, située au centre de l'Asie, semblent épuiser tout ce que l'on sait sur la question. Ses savants arguments ne contredisent d'ailleurs en rien les passages précédents, écrits, avant d'avoir pu se référer à "l'Erdkundé von Asien" Une connaissance longue et personelle du chameau et de son Arabe (cet ordre est adopté exprès) aboutit aux mêmes conclusions auxquelles une étude de la Bible, des monuments égyptiens, des géographes grecs et romains et de Joséphe, a conduit les savants, dont Ritter a résumé l'opinion dans les termes suivants:

"Le chameau ne fut introduit en Egypte de facon à s'engendrer, qu'à une période qui peut même avoir été postérieure à Mahomet.

"Son absence des monuments (1) montre que les Egyptiens ne l'élevèrent jamais au temps des Pharaons.

"Au temps de Ptolémés, la routeque suivaient les chameaux, entre la mer Rouge et le Nil, était pratiquée par les chameliers' arabes venant de l'Arabie avec leurs bêtes; et il existe une région, au sud du Maroc, qui semble avoir été occupée par de chameliers arabes. Au IVe siècle de l'ère chrétienne, les Sarrasins introduisirent cet animal pour la seconde ou la troisième fois. Dans tous les cas, il a été amené par la route de Bérénice à Coptos ou par des routes voisines, conduisant de la mer Rouge au Nil."

L'introduction du chameau au IVe siécle repose sur l'autorité d'inégale valeur d'Ammianus Marcellinus. Il semblerait pourtant faire allusion à la quantité de chameaux suffisante pour effectuer les transports sur la ligne de Bérénice à Coptos, et cela n'affecte en rien l'opinion que les chameaux ne commencèrent à s'engendrer en Egypte que lorsque leurs maîtres s'assirent en conquérants dans la vallée du Nil.

Jusqu'ici, tout a été dit pour soutenir la théorie d'après laquelle le chameau et son arabe ne sont devenus *casaniers* dans le pays qu'en l'an du Seigneur 640, c'est-à-dire il y a quelques 1200 ans.

Je n'ai entendu parler nulle part de la relation qui existe, ainsi que j'en ai fait l'expérience, entre l'Arabe, sa femme, et l'homme qui n'en est que le pasteur. En Arabie, plus qu' ailleurs, les femmes tiennent entre leurs mains des affaires importantes. Dans des pays où l'on fait cas de la capacité inventive, les situations sont renversées; mais, en Arabie, où l'on n'invente rien, un homme est grand lorsqu'il s'est marié avec des femmes possédant un grand nombre de chameaux.

Il semble très probable qu'à l'apparition des musulmans, les vallées étaient pleines des arbres d'aprés lesquels des Arabes ont nommé ces vallées. Il reste à examiner quelle est la part qui revient au chameau et au chamelier dans la destruction de ces arbres; car, tandis que le chameau mange les feuilles et les bourgeons, l'Arabe transforme en charbon de bois la tige, la racine et la branche.

(1) Il est peut-être plus curieux qu' important de noter que le mot employé par l'Arabe pour commander au chameau de s'agenouiller, "Barrak," est le même que le mot hiéroglyphique "Abraka," s'agenouiller en adoration devant un Dieu.

"Falco punicus" in Malta.

A young male falcon has been added to the Ornithological collection of the Malta University. It was taken with three others from its nest on the 1st May in the precipitous cliffs at Ta Cenc in Gozo. Itbelongs to the only species which breeds in the Maltese Islands. In Wright's Catalogue this species is considered as *Falco Peregrinus;* but Giglioli in his Avifauna Italica thinks that the species which breeds in Malta is rather *F. Punicus* Levaill. Saunders (Illust. man. of British Birds) appears to confirm this view when he states. "In Europe *F. Peregrinus* is found from Scandinavia and Nova Zembla down to the Mediterranean; but in the basin of that sea our larger form is only known in winter; the residents being of a small race *F. Punicus.*

N. Tagliaferro.

Animal Plagues.

Many countries possess wild animals, snakes, or insects that are dangerous or troublesome to man, some interesting particulars are given by Mr. P. L. Simmonds, F. L. S. In India 23,000 persons and over 68,000 cattle are killed by tigers, leopards, bears, wolves, and other carnivora, and in greatest proportion by snakes. Government bounty results in the annual killing of about 17,600 wild beasts and 578,000 snakes. Wolves have been troublesome in France, but the reward of £3 for each one killed is causing their rapid extermination. The Russian forests, in 1880, contained 170,000 wolves, which, together with bears, devour annually 200 children and travellers, 500 horses, more than 1000 oxen, and 4000 other domestic animals. In Austria 160 bears, 200 hyenas and 1200 wolves are slaughtered annually. Finland loses 5500 cattle each year by wolves. In Java 270 persons are killed yearly by tigers and 180 by crocodiles. The locust is a dreaded pest in northern Africa, Cyprus, and other quarters, where it often brings famine. In Cyprus a bonus of £40 a ton is paid for destroying the eggs, and in some years 60 tons-equivalent to 4680 million locusts-have been destroyed. Australasia has a liberal share of animal plagues. The kangaroos are an indigenous nuisance, each consuming as much grass as a sheep, and their numbers being so great that 10,000 a year for six consecutive years have been killed on a sheep run of 60,000 to 80,000 acres. The dingo or native dog is another foe of the settler, destroying many sheep. But the most formidable pest is the introduced rabbit, for whose destruction hundreds of thousands of pounds are now paid yearly, while the damage done amounts to millions. If undisturbed and sufficiently fed, two pairs of these creatures would in three years increase to the enormous number of 5,000,000. Victoria alone has 100 official inspectors and some 10,000 persons employed in rabbit extermination; while in New Zealand, which had not a rabbit twenty years ago but now exports 12,000,000 skins yearly, many colonists are thinking seriously of vacating the country with their flocks and herds.

The Malta Potato Disease

The partial failure of the potato crop in the Maltese Islands during last season calls for prompt attention on the part of our agriculturists.

We would, therefore, call the attention of the Maltese potato grower to the following preventive measures which have been suggested by the Director of the experiment station at Maine.

(1). Burn all of the tops and leaves after the crop is gathered. This is based on the belief that winter spores are developed in the stems and leaves, or that the mycelium may possibly hibernate in stems and tubers, and possibly winter spores also occur in them; they would no doubt survive in potatoes left on the ground.

(3.) Select seed for planting from fields or localities exempt from disease in previous season.

Great care should be exercised in selecting good seed. It is believed by some that diseased tubers are the principal means of infection.

(4.) Rotate the potatoe crop. This is based on the belief that the means of infection survives the winter in the potatoes, stems, and leaves left in the soil.

(5.) Burn all decayed potatoes taken from the cellar, or bins, and all other potato refuse; do not throw them on the compost heap, as the fungus retains its vitality, and is spread far and wide with the manure.

(6.) Plant early in the season, and those varieties that mature early. This is based upon the belief that the fungus does not mature until the warm summer months, and therefore early planting and early varieties would escape the disease from outside infection.

(7.) If cut seed is used, the surface should be allowed to dry, for when placed in the ground the fungus, if present, would find ready entrance to the tubers through the freshly-cut surface. This is based upon the belief that the means of continuing the fungus' occur in the soil.

(8.) If varieties less subject to the attack of rot can be found, select them for growing.

(9.) Potatoes affected should be dug immediately and marketed, as the disease rapidly spreads to the tubers in the ground, and is almost sure to spread in the bin if they are stored.

(10.) Thoroughly dry potatoes before storing them, they will germinate' and develop the 'disease in the pit or cellar.

(11.) Store in a dry, cool place, and keep dry as warmth and moisture favour the growth of the fungi.

(12.) Sort the potatoes in the cellar occasionally, and remove the infected ones, as the disease will spread from tuber to tuber. If a dry place is not obtainable, then dust the potatoes with dry, air-slaked lime, at the rate of one bushel of lime to 25 bushels of potatoes.

(14.) Plant on a sandy, loam, or a well-drained soil, as the moisture of a heavy or poorly-drained soil favours the disease.

(15.) Plant in narrow patches running at right angles to the prevailing summer winds. This is based on the fact that the disease usually starts from a few infected plants, and the disease is spread by the wind.

(16.) It has been recommended to soak the tubers for 24 hours in a solution of sulphate of copper; 6 ozs. dissolved in water is enough to cover a bushel.

(17.) It has been shown that the fungus has been destroyed by keeping the tubers for a few hours at a temperature of 105 to 115 Fahr., a degree of heat that does not injure them for seed. This is a promising method, as it would thoroughly disinfect the seed, which is a source of the disease.

(18.) Deep covering of seed and deep covering in cultivation have been recommended. It is believed that deep planting is unfavourable to the fungus, and that the summer spores cannot reach covered tubers so quickly.

(19.) Do not go through an uninfected field patch after walking throug an infected field; the spores will be carried on the clothing, and spread the infection.

(20.) Do not plant early and late varieties contiguous.

The Effect of Pressure in causing a thinning of Soft Strata.

It having been observed that, in many places in the Maltese Islands, the bed of clay that underlies the Coral Limestone has been much reduced in thickness, it has been suggested that the pressure of the overlying strata has had the effect of squeezing out the plastic clay beneath. The following observations on the extent to which such a thinning out by pressure is mechanically possible may be of interest to students of Maltese geology.

Suppose that AB (fig. 1) is a stratum of plastic clay, and that it is overlaid by the stratum of hard rock, CD. Let us suppose also that the strata terminate on the left with the escarpment AC, and that they continue indefinitely towards the right. The stratum of clay, AB, is supposed to lie on a bed of hard rock.

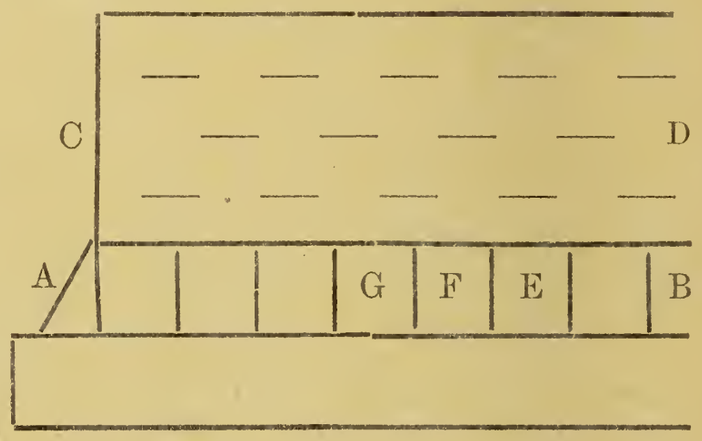

Fig. 1.

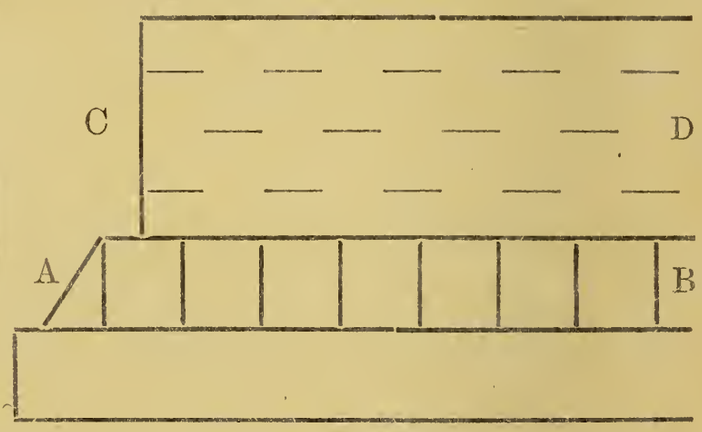

Fig. 2.

Let us imagine the stratum of clay to be divided into a number of rectangular prisms of square section as shewn in fig. 1. If now the superincumbent rock CD settles downwards, these squares will become elongated as shown in fig. 2, each prism being in-consequence shoved a little forwards by the pressure of the one behind, and the prism at the end will be sent beyond the face of the escarpment.

Now let us fix our attention on the prism F, and consider the forces that act on it. Suppose the pressure of the rock above to be equal to p tons per square foot. Then this pressure acting on the prism E will cause it to exert a lateral pressure on the prism F. tending to thrust it forwards towards A. This lateral pressure must be less than p, but it is proportional to it and consequently may be represented by ap in tons per square foot, where a is a coefficient depending on the plasticity of the clay.

On the other hand, the band of clay between A E is resisted in sliding forwards by the friction of the clay on itself at the upper and lower surfaces of the stratum. This resistance is proportional to the superincumbent pressure, p, and to the surface over which the sliding takes place.

Let us new consider what will happen to a slice of the stratum, l feet long, measured along the escarpment, d feet wide from A to E, the thickness of the stratum being t.

The force urging the slice forward from behind is $aplt$; and the friction which resists the motion is $bpld$ where b is the coefficient of on the upper and also on the lower surface of the stratum, or $bpld$ in all friction of the clay on itself. When 2 $bpld$ is less than $aplt$, motion will ensue, but when the former expression is the greater there will be no motion Suppose we make $aplt = 2\,bpld$

$$\text{Then } d = \frac{at.}{2b}$$

This last equation gives the greatest distance from the face of the escarpment at which sliding can take place for given values of a and b. For plastic clay a = 0·59 and b = 0·27, consequently d = 1·1 t. It appears from this that the extent to which the clay could be squeezed out would not much exceed the thickness of the stratum.

It will be noticed that the thickness of the overlying rock does not affect the result which is independent of vertical pressure. For, although the force urging the clay forwards increases with the pressure, the frictional resistance increases in exactly the same ratio.

The coefficients a and b are not independent. They are both functions of the "angle of repose," or the natural slope which a heap of material assumes when left to itself. This angle has been determined to be equal to 15°. Then

$$a = \frac{1 - \sin 15^\circ}{1 + \sin 15^\circ}, \text{ and } b = \tan 15^\circ.$$

We may conclude that the effect which mechanical pressure has in causing a thinning out of a soft stratum is inappreciable.

GAVIN J. BURNS B. Sc.

In the above cases Mr. Burns has considered the question from one point of view only viz that in which the layer of plastic material is *homogeneous* throughout, and is interstratified between two *horizontal* layers of rock the upper of which is of an *uniform thickness*. In such a case the pressure would be a constant and would always be exerted in a direction at right angles to the horizontal surfaces of the overlying rock masses.

Such physical conditions are not, however, to be met with among the Maltese strata; and Mr. Burn's formulae therefore applies only to the hypothetical case which he has quoted.

The dip that the Maltese strata have; the different thicknesses of the formations that rest upon the Clays, and therefore the variability of pressure which is exerted; the irregularity of outline of the upper and lower surfaces of the intercalated clay-bed; the non-homogeneous character, and the consequent variability in the porosity of the clays; and lastly the extent and direction of the faultings which have imparted to the upper strata of the plateaux a tendency to slide, and thus to squeeze out their plastic foundations; these constitute a few of the more important of the factors which must be taken into consideration before it will be possible to arrive at a satisfactory solution of the problem by the aid of mathematical formulæ.

J. H. COOKE.

The World's Coal Supply.

In the course of an valuable article on the above subject Mr. Lavard the editor of the *Coal Trade Journal* gives the general public some interesting details having reference to this most important subject.

He expatiates at considerable length on the quantity of anthracite which is at present available and specially refers to the views that were lately expressed by the President of the Leigh Coal and Navigation Company.

The President, he tells us contends that great quantities of coal are wasted through bad methods in preparing it for market These operations result in reducing a large proportion of the coal to sizes too small for the market, the percentage of waste from this source averaging as high as 20 per cent of the coal hoisted from the collieries, This has been somewhat diminished in recent years by the utilization of the smaller sizes of coal.

He thinks that this process of rescuing coal from the waste heaps is destined to go much further in the more general use of the finer particles of coal. He believes that it may not be going too far to suppose that improved methods of mining and of preparing coal may enable the use of fuel of one-half of the coal now remaining, so that it may be assumed that there are still 5,960,700,000 tons of anthracite available before the beds will be wholly exhausted.

The present annual consumption af anthracite is about 40,000,000 tons, and this consumption has been for some years increasing at the rate of 4 per cent. per annum. If the limit of annual product is placed at 60,000,000 tons, the United States should have coal at this average rate for about 100 years though this period may be some-what prolonged by the diminution of the output as parts of the field cease altogether to produce.

The production of coal in the world in 1891 was 519,083,731 tons, against a total output in the preceding year of 499,416,396 tons. During the last twenty years there has been a marked increase in the consumption of coal which was, no doubt, the author thinks commensurate with increased industrial activity.

Thus, comparing the European countries alone, the average annual output for the period of 1881 to 1890 was upward of 62,000,000 tons greater than during the previous decade, and that rate of increase bids fair to be maintained, so that the world's consumption of coal will soon reach well over 500,000,000 tons.

In an investigation made by a royal Commissioner as to the ascertainable sources of coal in Great Britain it was found that not more than 146,773,000.000 tons were available at depths not exceeding 4,000 feet from the surface, a reserve which, at the present rate of increase of population and of coal consumption, would be practically exhausted in less than 300 years. Industrial activity is not only multiplying the demands of consumption, but has a widening are a of use, to which the map of the two hemispheres is the only limit.

Wonderful deposits of coal are being constantly discovered in various parts of the United States. Within the last few years a particularly valuable field has been discovered in Washington, the extent of which is estimated at from 650,000 to 6˜5, 000 acres. In Wyoming, too, a new company, of which ex-Gov. Camphell of Ohio is one of the leading spirit is doing much to develop the valuable coal fields. The extent of these new fields is so great that nobody has yet attempted to follow the example of the Royal Commissioner and figure out in how many hundreds of years the coal supply of North America will be exhausted.

The slugs of the Maltese Islands.

BY

Dr. Alfred Caruana Gatto.

Slugs have been in all works dealing with the Maltese Molluscs either omitted all together as by Ponsonby, Benoit and Gulia, or the two species mentioned by Mamo in his "Enumeratio ordinata molluscorum Gaulo Melitensium" edited by Dr. A. A. Caruana, have been simply referred to. Mamo mentions in this work the *Limax variegatus=flavus* and the *L. gagates* which includes the *nigricaus.*

Fielden in the Zoologist No. 29. Vol. III May 1879. "The land and freshwater molluscs of the Maltese Group" refers to these two species, saying that the slugs collected by him, not having been kept in alcohol, could not be determined. Becher in the Journal of Conchology No. 8. Oct. 1884 declares that he did not care for the Limaces, and reproducing the *L. flavus* and the *L. gagates* of Mamo's list he adds:—

"Slugs are usually to be seen in damp weather, feeding on human excrement on the roadside; another favourite resort is at the mouth of old wells which are covered over with a door."

Issel in the Bollettino Malacologico Italiano, 1868, Anno 1, No. 1, — "Dei molluschi terrestri e d'acqua dolce raccolti nell' Arcipelago di Malta" mentions a new species of slug, found by him in Malta, at Valletta outside of Porta Reale, resembling the *agrestis*, but with the shield not *striate* nor *keeled*.

This species in the "Monografia dei Limacidi Italiani" was by Lessona and Pollonera named *L. melitensis*, but owing to the short and incomplete description which Issel had given of it, it was by them put amongst the doubtful species; the more so that the only specimens collected by Issel had been lost before he had described it Nor could it be well classified, because whilst all its characters refered it to a Limax, the shield was said to be *granular* and in the Limaces it is never such.

The doubts about this local slug so little known made me look very carefully for it in the locality where Issel said he had collected it and I succeeded in finding several specimens, in which I soon observed that the shield was *not* granular.

I sent these together with all the other species I had collected here to Prof. Pollonera of Turin, and he published under the title of Appunti di "Malacologia—Intorno ai Limacidi di Malta" in the "Bollettino dei Musei di Zoologia, ed Anatomia comparata della R. Università di Torino, Vol. VI. No. 99, Aprile 1891"—a very interesting note on our slugs, in which besides rectifying the first description of the *Limax melitensis*, given by Issel, he described a new species found among those I had sent to him, which he very kindly named after me *Agriolimax Caruanae*.

To Prof. Pollonera's paper there is little to be added, except with regard to some details concerning the description of the last mentioned species and the general distribution of all our slugs; but, even if there had been nothing to change or to add to it, his note is so little known, and it is such an important contribution to the knowledge of our land molluscs that it would be worth while going over the subject again.

Being sure that the opinion of such an authority will be duly appreciated I give Prof. Simroth's opinion on our two characteristic slugs which afterwards I had occasion to send to him, as also the figures both of *L. melitensis* and *A. Caruanae*, as I do not know that they have yet been figured.

Besides the following five species of slugs, Prof. Pollonera says in his note that I had sent to him some young specimens of an *Amalia* which he thought different from our other two species, and he adds that I had told him of the existence of another small *Limax* which I had not sent to him. I am bound to say that as to the *Amalia* I have now no doubt that it is only the so much varying *A. gagates*, and as to the *Limax* it is only the young state of the *L. melitensis*, which when young by its dark colour and slender body is easily mistaken for a new form.

The slugs therefore which have been till now collected in our Islands are:—

1. Limax flavus L. —*Maltese-Bugharuien—tal-biar.*

Limax variegatus, Drap.
" " *Mamo.*
" *flavus* *Pollonera.*

It is nocturnal in its habits; common in summer at the mouth of wells, in cellars and other damp and dark places.

2. Limax melitensis Less. et Pollonera.—*Figs. 2 a, 2 b., 2 c*

L. elongato conicus, minute et dense verrucosus, postice attenuatus, brevissime carinatus pallide cinereus unicolor; clypeo subtilier concentrice sulcato, postice perobtuse subangulato; capite albido, tentaculis pallide cinereis; solea pallida, unicolore. Mucus acqueus decoloratus.

Longit. 50-55 Mill.

Quum in alcool mersatus animal fuscum sit et clypeo nigrozonato patet. (Pollonera).

The living animal is of an uniform ashy colour, generally very pale, at the sides almost white, and it shows no trace of any spots or zones. When immersed in alcohol it becomes of a brownish tint on its back and on the shield, the white being preserved at its shield and on the shield appear two longitudinal lateral zones of a dark colour.

Prof. Pollonera speaking of this species says that although the chief character mentioned by Issel, the granularity of the shield, failed on a

close examination, yet the *L. melitensis* is not only a species well distinct from others, but that a particular section ought to be made for it in the Genus *Malacolimax* where it should find its place.

" I establish then, he says, for this species the subgenus *Melitolimax*, which preserving the radula of the other Malacolimaces—central tooth triaculeate, median teeth biaculeate—has a generative system similar to that of the *Lehmannia*, viz the very short, with a latero-terminal flagellum.

The digestive tube has six circumvolutions the last of which is provided with a caecum of smaller dimensions than that observed by me in *M. Valentinus Fer.*"

The subgenus *Melitolimax* is according to his opinion a connective link between the *Lehmannia* and the true *Malacolimax*.

Prof. Simroth on his part regards this species as a true *Lehmannia* allied to *L. arborum Bounch (marginatus Mull)*. He remarks to me that the *L. melitensis* has the penis gland *(flagellum)* a little longer than in the *L. valentianus*, which he regards as a variety of *L. arborum*, & that the *L. melitensis* might as well be considered as another marked variety of the *L. arborum*. He therefore does not acknowledge the necessity of creating a new subgenus for it.

Whether it be considered as a distinct species by itself or a variety of *L. arborum*, its affinities with *L. valentianus* are certainly very marked, and the question as to under what section it must fall depends from the greater or less extension which is given to these, what is important for us to state is that, specifically regarded, *L. melitensis* is a well defined local form.

I have met with this slug under moist stones in many other places in Malta, besides the locality mentioned by Issel e. g. Makluba, Vied Encita, Fort Manoel, Imtahleb; but it is never abundant. I have never found it in Gozo.

I must also note a *forma pallidissima* of it, of a very pale colour, which I found with the type at Makluba.

3. Agriolimax Caruanæ Pollonera.—*Figs. 1 a, 1 b, 1 c.*

L. plerumque parvulus, elongatus mediocriter rugosus, dorso minute verrucoso, fusco rufescente unicolore nel rare maculato punctulato, postice angustato, brevi carinato, carina nigricante; clipeo magno, elongato, grosse rugoso, pallide bruneo, rare et minutissime fusco punctulato; solea albida unicolore; capite tentaculisque cinereis, Mucus aqueus decoloratus.

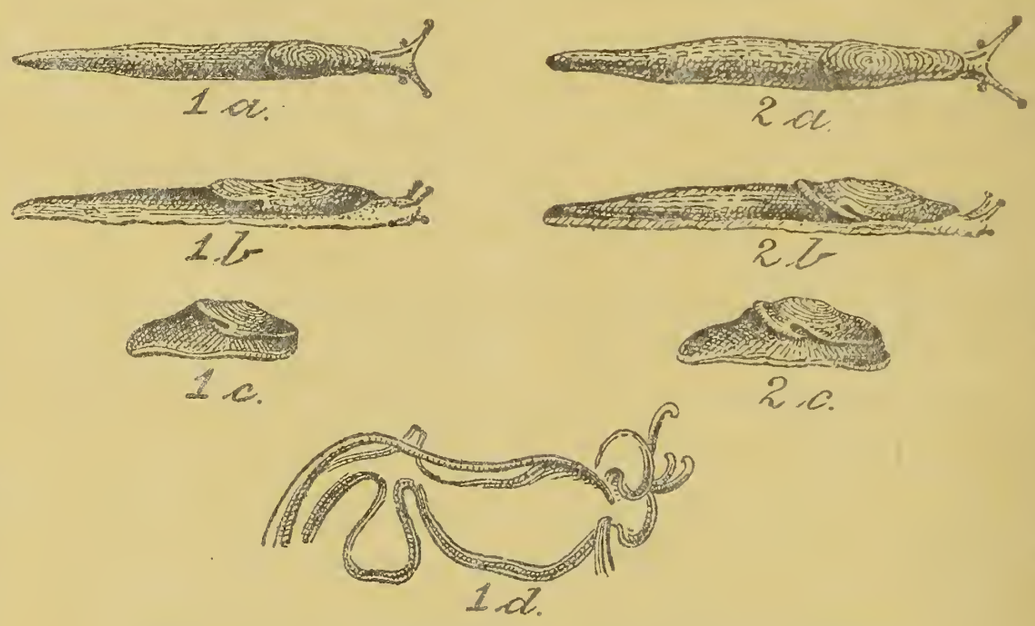

Fig. 1. a, b, c—Agriolimax Caruanæ Pollonera.
Fig. 1. d—Generative system of the same.
Fig. 2. a, b, c—Limax melitensis Less. et Pollonera.

In wet and moist localities under stones; e. g. Imtahleb, Boschetto, Makluba; Migiarro, Gozo; but it does not appear to be at all common.

There is a *forma concolor* of this slug, which has no points whatever, and is shield and all of an uniform tint. I collected it at Migiarro, Gozo.

In alcohol this species looks like a small *A. agrestis* from which it differs principally in the blackish carina which shows itself in dark relief on the back. The living animal differs from the *A agrestis* much more, because besides the above mentioned character it differs in its general gelatinous appearance, in having a transparent and watery mucus instead of a milky and opaque one; in the length of the shield and in its rugosities which are rougher and less numerous than those of *A. agrestis* approaching it to *A. brunneus*.

Anatomically *A. Caruanæ* differs from the *A. agrestis* in its generative system (Fig. 1 *d.*) It has like the *agrestis* the sack of the verge turgid and swollen but at its superior extremity there are two thick protuberances, elongated, rounded and curved, between the bases of which rise 3 or 4 flagelliform appendages, slender, smooth, of different dimensions and independent of one another from their base. While in the *A. agrestis* of the end of the sack of the verge there are one or two flagelliform appendages more or less branched and these branches are almost festooned and not smooth.

Besides these differences Prof. Simroth observes that *A. Caruanæ* has not the short coecum on the rectum of *A. agrestis*, and he has noted to me that the first, inside the verge, has a stimulating papilla somewhat greyish, flat and shorter than that of *A. agrestis*.

According to Prof. Simroth it is allied to *A. nitidus*, *Morelet* and *A. Maltzani Simroth*, but it quite deserves to be considered as a distinct local species.

4. Amalia carinata Risso.

I have found this species only in the ditches outside of Porte des Bombes Floriana, where in its proper season, it is very plentiful, under stones.

Prof. Pollonera notes the remarkable development of the vestibular prostate, which sometimes in our *A. carinata*, takes a glanduliform appearance but having noticed this difference in the same species from Messina and also in the *A. gagates* from Sicily and Sardigna he does not consider it of sufficient importance to constitute a variety of the tipical *A. carinata*.

5. Amalia gagates Drap. *Maltese-Bugharuien tat-torok.*

Limax nigricans, Mamo.
„ *gagates*, „
„ *nigricans, Issel.*

It is the commonest species found under stones in all damp places in Malta and Gozo e. g. Marsa, Fort Manoel, Hauli, Corradino, Ghirghenti etc, Migiarro, Xlendi, S. Blas etc.

It presents itself in three colour variations viz:—

a. Forma typica—Shield and back very black; pale sides.

b. plumbea Moq. Tand—Shield and back grey more or less dark; whitish sides.

c. F. pallidissima, Pollonera—Totally whitish or ashy pale, when the animal is living.

When it is immersed in alcohol it appears like the preceding variety, preserving only a lighter tint. But between this and the former variation there are many intermediate ones which offer all shades from black to an ashy white.

To conclude it remains to me only to say that with the exception of *L. flavus*, which is on the contrary commoner in summer, all the other species must be looked for from September to April, so that after a shower or a rainy day anyone may collect in winter a good number of specimens of all species. One more detail I wish to add is about the voracity of *L. gagates*, which has in several instances killed and devoured *L. melitensis*, *A. Caruanæ*, and even big specimens of *L. flavus* when put together. *L. gagates* and *L. flavus* are two species which cause often not indifferent damage both to kitchen and flower gardens.

The Street of Duels.

Of the many quaint and curious corners that exist in Valletta the capital city of Malta none is more interesting, or has more melancholy memories attached to it than Strada Stretta or the Street of Duels, so called because it was the place to which the knights of the Order of St. John used to resort to settle their quarrels with the sword. It is a narrow thoroughfare, with high sombre looking buildings on either side of it the overhanging balconies of which almost meet and thus give to it a very medieval aspect.

Most of these house were built by the knights either as private residences, or as Auberges for the various languages of the Order, and they are, therefore, all of the same substantial and enduring type as are all of the works which were erected by those Champions of Christendom. Many of these Auberges are situated in or around this street, so that in the olden times it was one of the principal thoroughfares used by the knights.

Being so militant a body of men, it is not to be wondered at that the rules by which their establishment was regulated should have been founded on some of the wildest, and most romantic principles of chivalry. The sword was the uni-

versal arbiter in all disputes between the members of the various chapters, and what is more strange the practice was not only sanctioned, but encouraged by the laws of the community.

Long after duelling had been abolished, and declared illegal in European countries, it continued to flourish under the fostering care of this belligerent brotherhood.

But even among them the practice was subject to numerous restrictions, the infraction of any of which led to the incurment of most severe penalties. Of these one of the most curious was, that the principals were allowed to fight in one particular street only, and that even there, if ordered to put up swords by either a *knight*, a *priest*, or a *woman* they were bound to instantly obey.

In so crowded a city as Valletta it might be thought that the difficulties thus placed in the way of duelling would be tantamount to its absolute prohibition: but this was not so. On the walls of this street are still to be seen numerous painted crosses indicating the places where duels had been fought, and knights had been slain.

In a letter which Mr. F. Byrdone F. R. S. wrote to a friend of his just before the occupation of the islands by the English, he recounted a curious incident connected with the Maltese practice of duelling which occurred but a short time before his arrival and for the truth of the particulars of which he could therefore vouch. Two knights had had a dispute at a billiard table and one of them after using a great deal of abusive language, added a blow. To the astonishment of all Malta after so great a provocation he absolutely refused to fight his antagonist. The challenge was repeated and time was given to him to reflect on the consequence, but he still refused to enter the lists. He was then condemned by a court of justices to make the *amende honorable* in the church of St. John for 15 days successively; and to be confined in a dungeon without light for five years after which he was to remain in the castle of St. Elmo for life. This sentence was rigorously carried out.

Diamond Making

The philosopher's stone is not sought by the modern chemist, yet he aims to transform common materials into brilliant gems. As long ago as 1880, Mr. Hannay showed diamond-like crystals which had been formed on heating under great pressure in an iron tube, a mixture of lithium, lampblack, essence of paraffin and bone oil. The nitrogenous compounds of the last substance were supposed to to have played an important part. M. Henri Moissan has not obtained carbonado, or black, diamond, and even some minute crystals of the colourless gem, by a process in which carbon from sugar is dissolved in a mass of iron and allowed to crystallize out under high pressure. The pressure is produced by the expansion of iron during condensation. The carbon is strongly compressed in an iron cylinder closed with a screw stopper then a quantity of soft iron is melted in an electric furnace, and the cylinder is plunged into it. The crucible is at once taken from the furnace, splashed with water, and slowly cooled in air. The iron is dissolved away by repeated treatment with acids and other reagents. Researches on the solubility of carbon in iron, silver and their alloys are being continued, and it is hoped that diamonds of appreciable size may soon be produced.

The Marls and Clays of the Maltese Islands.

BY.
John H. Cooke, B.Sc., F.G.S.

II.

The pressure of the overlying strata upon the plastic Clays has caused the original thickness of the formation to be much diminished in many parts of both islands, but especially so in the smaller plateaux and in the isolated hills; while in other localities the taluses that have been formed at the outcrops have, by cloaking the hillsides and cliff-sections, caused the thickness of the Clays to appear to be double and even treble of what it really is. It is to these estensive taluses that the many exagerated estimates of the thickness of the formation are due.

Great caution is needed in determining where the lower horizon of the Clays is situated, as no little experience is necessary to be able to distinguish between the transition bed of the Marls and Clays and the bands of argillaceous blue limestone which are distributed at various levels throughout the *Globigerina*-rock.

The most accurate measurements are those that were obtained in the well-shafts, and in the sections that were cut by the Engineer Corps at Gebel Imtarfa during the construction of the new road. The extreme thinning-out that the above measurements indicate is in every case due to local depressions. If a line be drawn from Gebel Ciantar to Selmone it will pass through the localities in which the Clays are most attenuated. The attenuation is apparently due to the north-east-by-east dip, which the strata have from the Great Fault to the eastern extremity of Malta. The pressure of the superincumbent strata on the Clays is therefore the greatest in that direction, with the result that the Clays have been compressed and thinned out at the outcrops on the east and north-east. In the shafts that have been cut in the Boschetto and Gomerino Valleys the Clays just exceed 20 feet in thickness, whereas at the eastern extremities of these valleys and of others situated along the same line the thickness barely exceeds 10 feet The strata lying between the northern side of the Great Fault and the fault which bounds the southern side of St. Paul's Bay dip in an easterly direction, so that the thickest part of the Clays is found on the western side at Ghain Tofiiha and Karraba, and the most attenuated along the western boundary of the Nasciar Plain.

In Gozo the thickness of the formation is not so variable, owing to the comparative absence of faults and the more uniform horizontality of the strata. At Fort Chambray, and along the shores of the bay at its foot, the Clay outcrop varies from 30 to 40 feet in thickness; but the taluses that have been formed along the slopes make the formation appear to be at least 120 feet thick. At a distance of $\frac{1}{4}$ mile east of Chambray a vertical section shows the Clays to be only 10 feet thick; this thinning-out is also attributable to the marked southerly dip of the overlying strata. In the isolated hills and smaller plateaux this dependence of the thickness of the Clay-formation upon the dip of the beds that overlie it is still more strikingly shown.

At Ghain Tofiiha, in Malta, a huge mass of rock having an area of about 100 acres, has been detached from the cliffs, and has fallen so as to dip towards the cliff of which it was formerly a part. The Clay-bed has been dislocated, and while on the shore side it shows a thickness of 20 feet, at the point of dislocation the bed has been thinned out to a few inches.

But is not only along the outcrops that these differences in thickness occur. The formation is overlain conformably by the Greensands, the line of demarcation between the two being as a rule well defined; but in some localities the transition is shown, by the admixture of the Clay and Greensand, to be of a very gradual character. This line of separation is by no means uniformly horizontal, and in places is takes an undulatory form. Both the Clays and the Greensands, therefore, vary greatly in their thickness, and it often happens, as at Dingli, where the Greensands are 50 feet and the Clays only 6 or 10 feet thick, that the maximum development of the Greensands is accompanied by a minimum thickness of the Clays. This undulatory surface of the Clays forms a series of natural reservoirs in which the rains of winter are stored, and it is from these that the population of the Islands derive their watersupply.

III. Lithological and Mineralogical Characters of the Strata.

A microscopic examination of numerous specimens that had been taken from various horizons (1) of the Clay-formation revealed the general structure of the rock, and showed it to consist of tests of foraminifera and minute fragments of minerals, the most numerous of which were oxide of iron and glauconite. Rounded grains of quartz, augite, hornblende, felspars, zircon, and tourmaline (2) were also present in comparative abundance in every part of the Clay, but more especially so in

(1) *Besides the many slides that I prepared myself, I was enabled, through the courtesy of Dr. John Murray, to examine the numerous sections which he had caused to be prepared, and which he subsequently described.*

(2) *Dr. John Murray, 'The Maltese Islands etc.,' Scot. Geogr. Mag. vol. VI (1890) p. 449.*

the upper portions near the junction with the Greensands.

Sulphate of lime in the form of selenite occurs also in considerable quantities. It is generally found in the Clay in isolated masses of varying size and shape, or in aggregations of small crystals that have grown round organic remains: these crystalline masses usually present a very lamellar or fibrous appearance. As a fertilizing agent their advantages are fully appreciated by the Maltese agriculturist, and it is partly to the abundance of selenite in the Marls and Clays that Malta and Gozo owe their luxuriant crops of clover and cereals.

A characteristic of the upper portions of the Clay-formation is the presence of yellow, ochreous nodules, of clay, the majority of which are ovoid or subspherical in shape: they are generally much flattened above and below. When these nodules are split along their bedding-planes the perforations of *Pholades* are revealed, and often the casts of the *Pholades* themselves are found within. Similar nodules, consisting of indurated blue clay, are equally abundant in the lower divisions of the Clay. In both varieties the laminæ show distinct evidencies of stratification, and they always occur lying parallel to the flattened surfaces of the nodules.

Prof. Leith Adams alluded to these nodules as being derivative (1); but, considering the nature of the clay of which they are composed and the contained foraminifera, it is more probable that many of them at any rate are indigenous to the formation in which they are found, and that they owe their origin to concretionary action due to the mutual attraction of the clay-particles one for the other. In connexion with this point it is important to note that the chemical composition and the mineralogical constitution, as well as the fossil contents of the nodules, are similar in every respect to that of the Clay in which the nodules occur.

According to the chemical analyses made by Dr. John Murray, (1) the different bands of the Clay vary greatly in their composition. These analyses I have repeated, and from them it is demonstrable that the proportion of calcium carbonate in the yellow and the dark blue clays ranges from 6 to 10 per cent., in the light blue varieties from 22 to 40 per cent., and in those parts where the Clays graduate into the underlying *Globigerina*-limestone as much as 67 per cent. of calcium carbonate has been detected. This carbonate of lime is made up for the most part of the tests of foraminifera and the discs of coccoliths, coccospheres and rhabdoliths.

Small quantities of phosphoric acid and traces of magnesia were also found by Dr. Murray in several specimens of Clay from Gozo. The magnesia is more distinctly preceptible in the rock of the upper horizon immediately beneath the Greensands, a fact which I am inclined to think may be due to the decomposition of glauconite (silicate of iron and magnesia), a mineral which occurs very plentifully in the Greensands.

The following table shows the extent of the quantitative variations of the several components of the rock:

Carbonate of lime	2 to 67 per cent.
Sulphate of lime	4 to 30 „
Carbon. of magnesi	faint traces to distinct traces.
Phosphate of lime	traces to 2 per cent.
Alumina	25 to 58 per cent.
Oxides of iron	4 to 10 „
Residue insoluble in dilute hydrochloric acid	3 to 10 „

The uppermost Clays are very compact and impermeable: they therefore form the water-bearing stratum of the Islands.

IV. The Organic Remains.

Organic remains are well represented in the Clays, both generically and specifically, but they are not equally abundant in every part of that formation. Prof. Leith Adams, (3) alluding to this subject, expressed an opinion that the fossils in the Clays are as numerous as those in the overlying and underlying rocks; but with this conclusion I cannot agree, for, despite the large number of genera and species, the number of individuals falls far short of that contained in any other of the Maltese formations.

(1) *Quart. Journ. Geol. Soc. XXXV. (1879) p. 519: and 'Notes of a Naturalist in the Nile Valley and Malta,' Edinburg, 1870, p. 131.*

(2) *'The Maltese Islands, etc.,' Scot. Geogr. Mag. vol. VI. (1890) p. 449.*

(3) *Quart. Journ. Geol. Soc. XXXV. (1870) p. 519* et seq.

The organic remains which occur in both the yellow and the blue clays are, as a rule, completely mineralized, their substance being replaced by peroxide of iron. It was on this account that so large a proportion of the fossils which I submitted to Prof. Capellini for identification were pronounced to be unrecognizable.

The most characteristic fossils of the formation are the 'sepiostaires' of a *Sepia*, the casts of several species of Nautilidæ, and the shells of *Pecten Koheni*, all of which are very numerous.

Several species of echinoderms occur, none of which are peculiar to the Clays, for they are also found in the nodule-beds of the underlying *Globigerina*-limestone.

The mollusca, the majority of which are in the form of casts, are represented by 47 species. The very incomplete state of our present knowledge of the *Globigerina*-limestone fossils will not admit of trustworthy comparisons being drawn between them and the Clay mollusca. I am, however, now at work on that formation, and it may be worth while to note here that the general facies of the fossils of the Clays has very much more in common with the *Globigerina*-limestone fossils than with those of the Greensand. The Pectinidæ of the Clays and the Greensands were critically examined by Dr. Simonelli, of Bologna, and of the six species found in the former bed all, with the exception of *P. Koheni*, occur in the *Globigerina*-limestone, whereas *P. Dubius* and *P. Reussi* were the only species found to be common to the Clays and Greensands. *P. Denudatus* is very abundant both in the *Globigerina* limestone and in the Clays.

The more calcareous parts of the Clays are made up almost entirely of foraminifera. Dr. John Murray enumerates 122 species in his paper, but to this number I have been able to add, with the assistance of Mr. E. A. Earland, 31 more, the names of which are appended. The blue varieties of the Clays appear to be the richest in foraminifera, and they are generally in a good state of preservation. Where, however, the Clays, are overlain by the Greensands, large patches composed almost entirely of foraminifera extend to depths varying from 6 to 18 inches into the Clay, thus presenting the appearance of pockets. The most numerous species found in these 'pockets' are small *Globigerinæ* associated with *Truncatulina lobatula*. Of the foraminifera found in the *Globigerina*-limestone 94 per cent. also occur in the Clays; but of those found in the Greensands only 37 per cent. are common to the Clays.

Fish-remains are not very abundant, and those that do occur are so badly preserved as to be scarcely recognizable. Teeth and vertebræ of sharks are fairly common; teeth of *Chrysophrys* are rare: and teeth and spines of *Ætobatis*, *Myliobatis*, and *Diodon* are occasionally met with. Large-sized fragments of bones of whales, dugongs and other mammals are very abundant, but are badly preserved.

List of the 'Clay' Fossils.

Mammalia.

Vertebræ and bones of whales, dolphins, dugongs, and manatees, sp. indet.; and jaws and teeth of *Phoca rugosidens*, Owen.

Pisces.

Carcharodon megalodon., *Oxyrhina*, sp., *Lamna*, sp. — Teeth & vertebræ very common.

Ætobatis, sp., *Myliobatis*, sp. — Teeth & spines common.

Diodon Scillæ. One tooth from Chambray, Gozo.

Chrysophrys. Teeth only, rare.

Vertebræ, sp. indet. Very common.

Cephalopoda.

Aturia Aturi, Bast. This is one of the commonest fossils of the Clays, and of the Upper *Globigerina*-limestone.

Sepia, sp. See Fuchs, 'Ueber den sogennanten Badner Tegel auf Malta.'

Pteropoda.

Vaginella depressa, Daudin. (Very common in the Clays.)

Hyalæa. (Casts only.)

Solenoconchæ.

Dentalium, sp. indet. (Casts.)

Gasteropoda.

Dolichotoma cataphracta, Brocchi.

—— *ramosa*, Basterot.

——, 2 sp. indet.

Murex vaginatus, Borson.

——, sp. indet.

Mitra, sp. indet.

Nassa granularis, Borson.

—— *exsculpata*, Bischof.

—— sp. indet.
Cassis, sp. indet.
Xenophora cumulans, Brougt., sp.
—— *testigera*, Bronn.
Natica, sp. indet.
Scalaria melitensis, Fuchs.—This pretty little shell was first figured and described by Fuchs. It is rare and averages only 20 mm. ($\frac{4}{5}$ inch) in length, and from 6 to 8 mm. ($\frac{1}{3}$ inch) in breadth.
Scalaria, nov. sp.
Trochus, sp. indet.
Dolium, sp. indet.
Volutilithes, sp.
Conus melitensis, de Gregorio.
Solarium. sp.
Cypræa, sp.
Rostellaria, sp.
(The 8 last-named are casts.)
Chenopus pes-pelicani, Philippi.

Lamellibranchiata.

Ostrea Bobylayei.
—— *tenuiplicata*.
Anomia costata.
Pecten Koheni, Fuchs. (Figured and described by Fuchs.)
—— *dubius*, Wood.
—— *Reussi*, Hörn.
—— *denudatus* Reuss.
——, sp. indet.
Spondylus crassicosta, Lam.
Nucula, 2 sp. indet. (Casts.)
Lucina sinuosa, Don.
Tellina. sp. indet.
Cardita, sp. indet.
Corbula gibba, Oliva.
Clavagella, sp.? comp. *C. oblita*, Michelotti.
Leda pellucida, Phil.
—— *fragilis*, Chenu.
Neæra, comp. *cuspidata*, Oliva.
Astarte, nov. sp.
Nucula, sp. indet. (Casts.)
Isocardia, sp. indet (Casts.)
Pholas, sp.
Marginella Deshayesi, Michelotti.

Brachiopoda.

Terebratula sinuosa, Bast. One specimen from Gebel Imtarfa.

Echinodermata.

Echinolampas Hayesianus, Desm.
Schizaster Desori, Wright.
—— *Parkinsoni*, Defrance.
Euspatangus de Koninckı, Wright.
Spatangoidea, sp. indet.
Cidaris, spines.
Pentacrinus Gastaldi, Michelotti.
(All these are common to every horizon, but rare in the upper ones.)

Anthozoa.

Ceratotrochus, sp. indet. Common.
Flabellum Fuchsii, Common.

Foraminifera.

To the 122 species contained in Dr. John Murray's list, the following 31 should be added:—
Miliolina agglutinans, d'Orb.
—— *Auberiana*, d'Orb.
Testularia carinata, d'Orb.
—— *rugosa*, Reuss.
Bulimina aculeata, d'Orb.
Lagena marginata, W. & B.
Nodosaria, consobrina, d'Orb.
Lingulina costata, d'Orb.
Marginulina Behmi, Reuss.
——, sp.
Vaginulina margaritifera, Batsch.
—— *Bruckenthali*, Neugeb.
—— *legumen*, Linn.
—— *reticulata*, Corneul.
Frondicularia interrupta, Karrer.
——, 3 sp. indet.
Cristellaria convergens, Bornem.
—— *variabilis*, Reuss.
—— *radiata*, Bornem.
—— *Kubingii*, Hantken.
—— *cassis*, F. & M.
Polymorphina communis, d'Orb.
Sagrina Raphanus, P. & J.
Planorbulina mediterranensis, (var.?), d'Orb.
Truncatulina lobatula, W. & J.
Nonionina umbilicatula, Montagu.
Polystomella crispa, Linn.
Nodosaria soluta, Reuss.
Orbitolites complanata, Lamarck.

City Dust.

The results of the eleboratore investigation of the dust of the streets of Naples, of which Dr. L. Manfredi has given an account are of a startl-

ting nature The number of microbes of all kinds was found to average 761,521,000 per gram, or about 21,600,000,000 per avoirdupois ounce. In the cleanest parts of the city the number was only 10,000,000 per gram, but in the business thoroughfares the average rose to to 1,000,000,000, and in some of the dirtiest streets it reached 5,000,000 000. In this vast mass of life were many disease —producing microbes, and the healthfulness of the streets varied with the total number of microbes Tests of the infectiveness of the dust gave positive results in 73 per cent of the experiments. Of 42 cases of disease induced in Guinea pigs by inoculatlons with the dust of Naples, the microbe of pus was found in 8 the bacillus of malignant edama in 4, the bacillus of tetanus in 2, and the tubercle bacillus in 3. Not all city dust has the microbe—breeding powers of that of Naples, but the difference is believed to be only in degree.

Geological Notes of Acireale

BY

GAETANO PLATANIA

III.

Without occupying myself with the beautiful prismatic basalts, sometimes extremely well preserved and at others more or less altered and crumbling; nor stopping to describe the fan shaped sections of the radiated basalts, which form splendid natural rock walls, I will devote a few words to the globular basalts of Acicastello and of these hills. These globular basalts may be divided into two categories, namely; firstly the comparatively large, divided into prismatic wedges, radiating from the centre and sometimes articulated, secondly, in globular basalts with a concentric cleavage, of most variable dimensions, which sometimes enclose foreign rocks. Both are commonly found near metamorphosed tuff-beds and those nearest to these tuffs presents a thin vitreous cracked crust. The basaltic globes are often slightly deformed in consequences of the reciprocal pressure of one against another when they were yet in a pasty state. This however, does not prevent the general existences of variously sized interspaces between them which is occupied by clay aud tuff. Of particnlar interest are little globes of about a centimetre in diameter which consist externally of a vitreous crust, internally of basalt magma with crystals of Olivine, Pyroxenes and Felspar.

All the basalts of Aci-Trezza and Aci-Castello probably due to the injection of magma into a thick stratum of submarine silt which occupies, as has already been said, the interspaces between the different globes. The globular structure is probably due to the phenomenon observed experimentally by Dr. Johnston Lavis that injecting into a dense viscous liquid (in this case the submarine silt) another dense liquid (basalt magma) this latter assumes the form of spheres with a narrow neck which may be divided leaving the spheres detached. Each globe has a different surface of cooling which with the consequent contraction extends from without inwards and divides the globe into a number of radiating wedges. (1.)

The globes at their periphery in which the cooling was most rapid are vitrified at the surface, being covered by a glassy crust, the formation of which was aided by chemical reaction between the basalt magma and the clay with which the former was in contact. (2.)

The concentric cleavage which is often exhibited by the globular basalts is quite distinct from that produced by the decomposition due to meteoric agencies, as in the of the Balzo to the N. of Acireale In this case the blocks of lava are irregular prisms of lava which shelling and cleaving little by little, assume a spherical form until by cracking them one encounters a less decomposed nucleus.

In the true globular basalts the globes are preexistent to the action of meteoric agents, and indipendent of the latter, and the concentric cleavage also depends on the process of cooling, the radiating wedges, dividing into a number of joints, so that the crusts, which in consequence of the columar cleavage separate into fragments which

(1) By using a coloured syrup and injecting into a liquid one, the coloured material spreads out in a cauliflower fashion but the whole mass looks like so many globes. A careful examination of globular basalts shows that many are not simple globes but rather pear shaped masses with a narrow neck which is often absent having been divided while still fluid. Ed.

(2) The author probably refers here to the pelagonitized layer covering the globes? Ed.

are generally prismatic, and simply represent the flattened jointed structure of straight basalts columns. No doubt at the same time meteoric agencies have aided in rendering the concentric shelling more evident.

Leaving the basalts hills and proceeding still farther from the coast to near Aci. S. Filippo the clay beds, covered with numerous and enormous angular blocks of lava, are circumscribed by a step-like elevation formed of different recent lava streams. Upon it are situated smiling villages, elegant villas, and below at the contact of the lava and the clay numerous limpid springs gush forth.

Near Reitana fossil remains of elephants have been found by others, and I have collected some myself in a new tunnel now in construction. In this locality, at about 1 m. from the surface of the ground, occurs an interesting stratum of white pumice, much altered and already become friable. It has been said and repeated several times that no true pumice was to be fonnd at Etna and it is in consequence of this that Prof. Basile maintains that this comes from the Lipari Islands; floated here on the sea. (1) Microscopic analysis and careful study of its mode of occurence is likely to settle the question of its true origin (2.) These pumices extend under the lava as far as Sia. Venera where there gushes forth the celebrated springs of sulphur water (Sulphuro-saline-iodo-lithia-manganesiferous-hydrocarbonated) (3.)

It is mainly to the waters the Acireale owes its great importance as a first class climatic station for the treatment of disease. The Romans built sumptuos *Thermae* near these springs, the ruins of which still resists the assaults of time. All around us this charming country, in different excavations have been found mosaics, statues, neglected by the Government and the Municipality of Acireale. This is still more the case, since the celebrated polemic concerning the origin of Xephonia and Acireale would have in them so many precious documents to help in solving the question. Much praise is however due to the efforts of the *Accademia delle Scienze* of Acireale, which in the picture gallery possessed by it proposes to incorporate an archeological museum combined with the little collection of natural history which also belongs to that body and which is now being gradually increased.

(1) G. Basile.—L'Elefante fossile nel terreno vulcanico dell'Etna.—Atti. d. Accad. Gioenta. Ser. III, Vol. XI.

(2) Either the Val the Bove is not a crater of explosion or true pumice should be found at Etna. Ed.

(3) Silvestri O.—Sulle sorgenti idrogassose di S. Venera al pozzo.—Catania, 1873.

The 'Pola' Deep-Sea Explorations.

The full results of the deep-sea explorations which were made during the last three summers in the Eastern Mediterranean basin on board the *Pola* have says the *Geographical Magazine* just been issued as a separate work. The Vienna Academy of Sciences has decided to continue the same explorations in the Aegæan and the Marmora Seas this summer. The configuration of the sea-bed, the temperature, the density and salinity of water at great and small depths, as well as the colour of water, its transparency, and its permeability for chemical rays, will be studied, as well as the organic life at various depths. The *Pola*, which is supplied with the very best instruments, and is well equipped for its special purpose, will be under the command of Captain W. Moerth. Hofrath F. Steindachner, Director of the Zoological Department of the Natural History Museum, will have the general management of scientific work; while J. Luksch, Professor of the Marine Academy, undertakes to make the physical observations; Dr. K. Natterer will carry on the chemical work; and Dr. E. von Marenzeller, who has just communicated to the Academy an elaborate 'Report upon New Deep sea Echinoderms,' will make the biological explorations. The soundings will be carried on by naval officers.

On the Occurrence of Lignite in the Globigerina bed of Malta.

A discovery of considerable importance from a scientific point of view was made last month during the cutting of a tunnel at the Notabile Terminus of the Malta Railway. At a distance of about 130 feet from the station one of the quarrymen came across a piece of lignite embedded in the blue variety of the upper Globigerina Limestone at a level of two feet above that of the railroad.

The level of the railroad at the Notabile Terminus corresponds exactly with that of the uppermost nodule seam in the blue variety of the upper Globigerina Limestone, which is found outcropping at the bottom of the railway cutting.

The upper layers of the Globigerina Limestone have been referred by Fuchs to the *Horner Schichten* of the Vienna basin which are contemporaneous with the Langhian Series of the Miocene series.

These layers were according to Mr. Cooke deposited on an ascending sea bottom at a depth of nearly 300 fathoms.

The piece of lignite, embedded in a block of stone, has been presented to the Museum of the University by Mr. L. Gatt. C.E. the able Manager of the Malta Railway.

The lignite has a brownish-black appearance and is in a rather advanced state of mineralization. It is laminated, brittle, and reveals a decidedly woody texture.

It measures 11 inches in length, 4 in in breadth and $\frac{3}{4}$ to 1″ in average thickness. Its transverse section is somewhat curved presenting the form of a segment of a circular corona which seems to indicate that the wood belonged to the bark or outer layer of a trunk or branch 5 to 6 feet in diameter. Its substance, which is entirely soluble in boiling nitric acid "emits in burning" tiny reddish sparks and the very disagreeable smell of rotten cabbage.

From a summary analysis made at my request by my friend Dr. Temistocle Zammit, the talented analytical chemist of the Sanitary Office, it appears that 90. 4 p. cent of the substance volatilize at a red heat and that of the residue 19. 6 p. cent, consists principally of oxide of iron.

The moisture evaporated at 104° c. was 15. 4. p. c., which is very moderate considering that in certain cases it is as high as 50 p. c. The absolute density at 20° c.was found to be 1.31, and the relative 1.012.

When a complete analysis of the substance will have be en made, some of these figures will very likely have to be corrected.

Although this is the first occasion in which the occurrence of lignite in the Maltese beds is recorded, I am informed by the workman, Paolo Azzopardi, who made the discovery, that some twelve years back, whilst working at excavating the same rock exactly at the extremity of the railroad and at a heigth of a few feet from the level of the railroad, a piece of dark brown wood presenting the same appearance and measuring nearly 2 feet in length and 4 inches in breath was discovered by him and handed over to Mr. Crescimanno the then contractor, who presented it to Mr. Geneste the Director of the railway.

Mr. Crescimanno informs me that during the excavation of the Somerset Dock two similar pieces of dark-brown "coal" were discovered in the blue variety of the Globigerina Limestone near the sea level, and were presented by him to Mr. Andrews the Engineer; but nothing was ever heard of that discovery.

I may also mention that in the geological collection of the Museum at the Public Library there exists several objects labelled by Sir William Reid as fossil wood found in 1855 in the blue clay at Boschetto; but as some doubts have been expressed by eminent geologists as to the true nature of those specimens I consider it as premature to express at present any opinion on the subject. It is my intention to submit, with the approval of the Director of Education, some of these specimens for a thorough analysis by some competent specialist.

In the same collection there exists also a piece of partly charred anthracite labelled found by Dr. Collings in the Cliffs near Casal Dingli at a height of 700 feet above the sea level. I need hardly that the indication, if genuine, is so vague that it has no real scientific value.

N. Tagliaferro.

SCIENCE GOSSIP.

DR. A. M. Edwards of 11 Washington St. New York U.S.A., desires to obtain, for cash or exchange, specimens of Infusorial (Diatomaceous) deposits or earths, some algæ, Guanos, Coral mud or recent Infusoria.

AT a recent meeting of the Royal Geographical Society, Prof. Bonney F. R. S. read a most interesting paper entitled "Do Glaciers excavate," in the course of which he vigorously attacked the school headed by Sir A. Ramsay, the members of which at-

tribute the origin of the great lake basins of Switzerland to the action of Glaciers. Prof. Bonney holds that these great lake and rock basins owe their origin to sub-ærial influences assisted by differential earth movements, and that the glaciers which at present occupy them do no more than modify the more prominent physical features of these basins.

THE unusually dry weather which has prevailed in and around the Mediterranean during the last two months has caused considerable distress in the agricultural districts. It has not however, been an altogether unmixed evil. The vines in both Sicily and the Maltese Islands have been, are still are remarkably free from all trace of the malignant *Peronospera* which effected such wholesale devastation last year, a fact that is to be attributed to the absence of those humid atmospheric conditions which characterized the months of April and May 1892.

THE *Aphididæ* have been usually abundant and destructive in the Maltese Islands during the recent Winter and Spring months. The beans, peas, fruit-trees, and in fact every kind of agricultural produce have suffered, and still are suffering to a greater or lesser extent from their attacks. These minute pests derive the greater portion of their food supply from the juices of the leaves and blossoms, and by thus preventing the leaves and blossoms from performing their proper functions, they retard their growth and diminish the quantity and quality of the crop.

THANKS, however, to the endeavours of those industrious mites of creation known as the *Coccinellidæ* the prospects of the Maltese farmer though heavily handicapped by his numerous foes, are not entirely hopeless. Several species of the family of the *Coccinellidæ*, known among the Maltese by a variety of names such as *Bestiolina del Signore*, *Saibella* and *Cola*, have this year been also unusually abundant, and as these little creatures are the inveterate enemies of all *scale insects*, *aphides*, and *parasitic fungi*, they have assisted greatly in minimising what at one period of the year threatened to become a serious scourge to the Maltese agriculturist.

The enormous amount of good that they are capable of doing for the agriculture of the islands in general, and for the fruit growers in particular is incalculable, and every farmer should therefore, consider is a sacred duty to see that these little friends are fostered and protected. Great quantities of them are at present at work in the orange groves of Musta, St. Antonio, and Boschetto devouring the scales with which the oleanders, the orange, and other trees are covered.

A new work by Mr. H. M. Wilson states that by irrigation 25,000,000 acres are made fruitful in India alone. In Egypt there are about 6,000,000 acres, and in Europe about 5,000,000. The United States has but just began the work of improving its waste area, but has already about 4.000,000 acres of irrigated lands.

IT has been known for several years that the germs of some diseases pass unharmed through the digestive system of flies. A German bacteriologist has now added Asiatic cholera to the list of diseases, finding that the cholera bacteria may survive 72 hours, or even longer, in the intestines of flies, while it is probable that under some conditions they may multiply there.

IN mountainous regions erosion produces such rapid and disastrous changes that the Swiss Government is seeking to regulate the torrents of that country. A frequent source of floods is the damming up of a large river by the mud and stones brought down by a freshet in a small tributary. This danger is avoided by building a succession of weirs and cutting a parallel canal, the sediment being thus caught and the overflow regulated before the water reaches the main valley.

TO Mr. A. C. Ranyard, the English astronomer and editor of *Knowledge*, it seems that the nebulae we see have a greater analogy with the solar corona than with the fiery condensing mists conceived of by La Place; they are very generally associated with stars, and in some cases the nebulous matter has issued from the star, and in sometimes from a starless region. The forms of nebulae are certainly in general inconsistent with the theory that stars are condensing from nebulae."

ABOUT twenty years ago the Government of the Maltese Islands went to considerable expense for the purpose of clearing out and restoring the interesting Phœnician tank, known as *Shgharet-Medeuiet* which is situated in close proximity to the temple of Melcarte at Marsa Scirocco, Malta. The pilasters were trusssed, the large slabs with which the structure was roofed were afforded additional supports, and an iron railing was built around the steps for the convenience of the many visitors who annually went to inspect the ruins. Latterly, however, the place seems to have been scandalously neglected and illused; and at the present line it is in a condition that reflects but little credit upon those who are responsible for the safe keeping of these heirlooms of the Maltese people. Many of the roofing slabs have been displaced, broken, and precipitated into the bottom of the tank; several of the supports have been damaged; and the iron railing has been torn from its place and taken bodily away. If the work of demolition continues at this rate, *Shgharet-Medeuiet* will not, in a few years to come, have one stone left upon another. Who is responsible for this vandalism?

HITHERTO the Maltese Islands have invariably felt the effects of the more severe earthquakes that have occurred in the Levant; and they have been exempt from those that have had their origin in and about Sicily and Southern Italy. During the east five years the islands have, however, experienced no shocks from any quarter whatever. No indications of the recent severe earthquakes which convulsed Zante have been felt.

THE notion that a fish diet contributes to the development of leprosy is upheld by the President of the London Medical Society, who, however, does not regard this diet as capable of starting the disease in a healthy person. He has exhibited a patient who is recovering from leprosy through treatment with small doses of arsenic and abstinence from fish. The peculiar patches have disappeared from this patient, but the hands and feet are insensitive to heat and cold and to pain. It is stated that mild cases usually recover in the English climate under treatment with regulated diet.

OUR later science has given us a new chemistry, a new astronomy, and a new geology, Mr. Lester F. Ward urges the importance of a new botany. This should not only concern itself with existing plants, but should seek to trace the origin and development of vegetable life in past ages. A great number of fossil species, extending by successive stages through a long range of geological time, are now known. Thus far these have been studied only in the light of geology, and botanists having the facilities of great universities at hand may now hope to obtain from these ancient forms something like a complete history of plant development. "No grander theme," declares Mr. Ward, present itself to the scientific world."

THE belief is gaining strength that the model farm of the future will be an electric one. The necessary current can be had by utilizing the wasted forces of nature—the waterfalls being sufficient in many places, while in others windmills can be used in connection with storage batteries. Inventors are undoubtedly capable of adapting electric machines to every kind of farm work. With well-made roads, electrically-lighted houses and a well-planned equipment of electric

machinery — including, possibly, electric carts and carriages—the lot of the tiller of the soil will be greatly improved.

IN the bog of Denmark and neighbouring parts of Sweden and of the Baltic coast of Germany, have been found a number of "lurs," curious musical instruments of the bronze age. Most of these-about a score—are now in the National Museum of Copenhagen. Several have been carefully put in order, and some skilled musicians have played upon the instruments, demonstrating the remarkable musical as well as constructive knowledge of the unknown makers of some 3000 years ago. The lur is six or seven feet long, and resembles a regularly tapering animal's horn twisted into a double curve, the butt or farther end being furnished with an ornamental collar. The material is a kind of bronze, which is only about one-twentieth of an inch thick, and was cast in small sections and afterward joined together. The instruments seem to have been used in pairs, curved in opposite directions, and, when being blown, to have been held in front of the players with the butt collars facing one another.

A French botanist records that the same flower of an orchid emits decidedly different odours at different times, and that there is even a very remarkable periodicity in the development of the perfume of certain orchids.

FROM the current number of the *Geographical Magazine* we learn that the survey of Greece which was begun in 1889 by the officers of the Imperial Military Geographical Institute, under the management of Lieut.-Col. H. Hartl, is already so advanced that the triangulation-net has been extended over the whole Kingdom. This year, a detailed topographical survey of Thessaly, which was begun in 1891, will be continued. At the same time, the Academy of Sciences sent out the geologist Hilber and the botanist Eugen von Hallaci for the exploration of the yet unknown highlands of North-West Thessaly. The botanical exploration of this province is the more desirable, as what is already known of the flora of Thessaly shows that it differs greatly from the general flora of the Balkan Peninsula. A young botanist will also be sent to Albania, in order to study the distribution of the Alpine flora. Interesting results are expected from these researches as well, the vegetation of the Balkan Peninsula generally offering a very original character.

"NATURAL Science" for May contains among other interesting articles "Natural Selection and Lamarckism" by W. Platt Ball; "Biological Theories" by Dr. H. Hurst; "The Succession of teeth in mammals" by Miss Pollard; "Climate and Floral Regions in Africa" by P. Scott Eliot. In response to the several correspondents who have asked us, we now give the name and address of the publishers—Macmillan & Co., 29, Bedford St. Strand W. C.

THE natives of the interior of Ceylon finish walls and roofs with a paste of slacked lime gluten and alum, which glazes and is so durable that specimens three centuries old are now to be seen. On the Malabar coast the flat bamboo roofs are covered with a mixture of cow-dung: straw and clay This is a poor conductor of heat, and not only withstands the heavy rains to a remarkable degree but keeps the huts cool in hot weather In Sumatra the native woman braid a coarse cloth of palm leaves for the edge and top of the roofs. Many of the old Buddhist temples in India and Ceylon had roofs made out of cut stone blocks, hewed timber and split bamboo poles Uneven planks cut from old and dead-palm trees-seldom from living young trees--are much used in the Celebes and Phillipines. Shark's skins from the roofs of fishermen in the Andaman Islands. The Malays of Malacca, Sumatra and Java have a roofing of attaps, pieces of palm—leaf wicker work about three feet by

two in size and an inch thick, which are laid like shingles and are practically waterproof, The Arabs of the East Indies make a durable roof paint of slacked lime, blood and cement. Europeans sometimes use old sails—made proofs against water, mould and insects by paraffin and corrosive sublimate —for temporary roofs.

VARIOUS attempts have been made to account for the diversity in shape seen in eggs. A recent study convinces Dr. Nicolsky that the differences may be all traced to gravity, and he finds his idea confirmed by all the eggs, in the zoological collection of the St. Petersburg University. He supposes that pressure by the sides of the ovary tends to elongate the egg before the shell has hardened. In birds which keep a vertical position while at rest. as do the falcon and the owl, the soft egg is made short by the action of the weight of the body against the ovarion pressure; while in birds that, like the, grebe, are nearly always swimming, the egg is lengthened because the bird's weight acts with the compression by the ovary. The egg is made more pointed at one end than at the other in birds that like the guillemot are frequently changing their position—sometimes swimming and diving, sometimes perching on the rocks, etc.

BEYOND 29,000 feet above sea—level, the height reached by Glaisher in 1862, man has never been able to navigate the air. Various problems concerning the region farther away —such as the temperature, the pressure, the quantity of moisture, the composition of the air, etc.,—have attracted the attention of physicists, and have at last led to the experiments of M' Hermite' who during the last few months have been sending up pilot balloons carrying registering apparatus. These balloons are very light, with a capacity of about 100 to 200 cubic feet. Falling at distances from Paris ranging up to 200 miles, the balloons have nearly all been returned by their finders as requested on a card attached to each, and one has brought down records from a height of 30,000 feet. The instruments used are very light and simple. With larger balloons and systematic exploration, it is hoped that the secrets of the air up to at least 40,000 feet may be made as familiar to us as those of the deepest and darkest depths of the sea are gradually becoming.

MR. Boys with his radio-micrometer, says *Knowledge*, can observe a deflection of the instrument which is due to a temperature difference of less than one two-millionth of a degree centigrade. In one particular case the surface receiving the radiant heat is a disc only 2 millimeters (about $\frac{1}{12}$ inch) in diameter, and when the scale is 30 inches from the mirror, the hand held about a yard from the instrument produces at once a deflection of 16 centimeters ($6\frac{1}{2}$ inches), shown by the spot of light thrown by the mirror on the scale. Mr. Boys also calculates that the heat received by a halfpenny at 1500 feet from a candle flame would, if concentrated on the sensitive surface, produce a readable deflection.

IT has been pointed out that the elaborate paintings of Egyptian tombs must have been made without lights that produced smoke. An American artist has suggested that the electric light was known and used, but W. Flinders Petrie finds that the dark rooms could have been lighted by sunlight reflected by rude mirrors.

THE odd fact that the forked-tail moth *(Dicranura vinula)* is a chemist of considerable capacity was shown at a recent meeting of the London Entomological Society. It was previously known that its larvae, like ants, secrete formic acid. To this Mr. Oswald Latter added the new and surprising discovery that the mouth of the adult moth secretes caustic potash, with which it softens its cocoon and enables itself to emerge. Caustic potash is a powerful cautery, capable of destroying the human skin, and its secretion by any animal is a unique revelation.

Metereological Report.

Lat. 35° 55′ N. Long. 14° 29′ E.

Barometer Readings reduced to 32° F. at sea level.

ST. IGNATIUS' COLLEGE
MALTA.
1893.

Results of observations taken during the month of	March		Average 10 years	April	Average 10 years
Mean Reading of Barometer	inches	30·073	29·989	30·048	29·925
Highest „ „ on the 13th	„	30·385	30·363	30·386	30·256
Lowest „ „ on the 31st	„	29·771	29·496	29·705	29·499
Range of Barometer Readings		0·614	0·867	0·681	0·757
Highest Reading of Max: Therm: on the 18th ...		66·2°	74·7°	77·7°	77·1°
Lowest Reading of Min: Therm: on the 22nd ...		44·2°	42·9°	47·2°	48·0°
Range of Thermometer Readings		22·0°	31·8°	30·5°	29·1°
Greatest Range in 24 hours on the 22nd		19·8°	23·1°	22·1°	22·1°
Mean of all the highest Readings		61·9°	63·3°	66·9°	67·4°
Mean of all the lowest Readings		49·4°	50·8°	53·1°	54·3°
Mean Daily Range		12·5°	12·5°	13·8°	13·1°
Mean Temperature (deduced from Max: and Min.)		55·0°	56·2°	59·0°	59·9°
Mean Temperature (deduced from Dry Bulb.) ...		53·8°	55·6°	58·6°	59·6°
Adopted Mean Temperature		54·4°	55·9°	58·8°	59·8°
Mean Temperature of Evaporation		50·5°	51·9°	55·5°	55·6°
Mean Temperature of Dew point		47·5°	48·7°	52·7°	52·1°
Mean Elastic force of Vapour	inches	0·329	0·345	0·399	0·389
Mean Weight of Vapour in a cubic foot of air ...	grains	3·7	3·9	4·4	4·4
Mean additional weight required for saturation...	„	0·9	1·1	1·1	1·4
Mean degree of Humidity		79	79	81	77
Mean Weight of a cubic foot of air	grains	540·4	537·0	534·4	531·0
Fall of Rain	inches	2·268	0·896	0·247	0·768
Number of days on which Rain fell		7	7	3	6
Mean amount of Cloud (an overcast sky = 10) ...		4·5	4·4	4·3	4·3
Total number of miles of Wind indicated ...		7271	8175	6585	8473
Mean Velocity of Wind per hour...	miles	9·8	10·9	6·6	11·8

REMARKS.

March.

Dew Point: ranged between 56·6° on the 17th and 34·8° on the 27th.
In Sunshine: the highest reading was 129·2° on the 25th.
On Ground: the lowest reading was 38·0° on the 22nd.
Thunderstorms passed on the 2nd.
Lightning was seen on the 7th and 25th.
Total Rainfall since last June 25·669 inches; the average of 10 years, 17·778 inches.

April.

Dew Point: ranged between 38·7° on the 12th and 60·3° on the 23rd.
In Sunshine: the highest reading was 134·1° on the 28th.
On Ground: the lowest reading was 41·9° on the 18th.
Lightning was seen on the 9th.
Total Rainfall since last June 25·669 inches; the average of 10 years, 18·546 inches.

(Signed) JAMES SCOLES, S. J.

Chess.

"Labor et constantia"

All communications connected with this column to be addressed to the Editor of the Chess Column 48 Strada Mercanti.

With the kind permission of the Editor of this review we are enabled to announce the formation and what we trust will prove to be the permanent establishment of a Chess column for the delectation of those of the readers of the *Mediterranean Naturalist* who take an interest in the noble game of Chess.

Compatible with the limited space at our disposal we hope to keep our contributors *au fait* on the leading Chess topics of the day, to give them some of the current games, to offer problems and solutions, and to proffer such assistance as it may lay in our power to afford.

We would, therefore, invite our friends of the *Malta Chronicle* Chess column, and of the *Chess Amateur* to one and all cooperate with us in our task and to accord us that moral help which is so essential to an undertaking of this description.

THE EDITOR.

Chess Literature

The literature of chess has assumed such gigantic proportions that an extensive library might be collected of works on chess alone

The *New York* Clipper, some time ago, contained a clever Article on the "stupendous bibliotheca of Caîssan literature"; it estimated that five magazines, five newspaper columns, and four books had given publicity to nearly 30,000 chess problems and nearly 25,000 games, in addition to end-games, analysis, notes, comments on current tournaments, etc. Making every allowance for the probability of numerous duplicate problems and games, it must be borne in mind that the above figures are taken from only a few leading sources less than one per cent. of the aggregate of chess literature. What evidence of the inexhaustibility of Chess! *(British Chess Magazine)*

Games

We do not think that we can better begin our series of games then with the following brilliant contest between the immortal Paul Morphy, the once distinguished champion in Europe and America, and the Duke of Brunswick and Count Isouard, which is extracted from Morphy's Collection of Games annotated by J. Löwenthal.

White (Mr. M.)	Black (Duke of B. &.)
1. P to K 4.	P to K 4
2. Kt. to K B 3	P to Q 3
3. P to Q 4	B to Kt 5
4. P tks P	B tks Kt
5. Q tks B	P tks P
6. B to Q B 4	Kt to K B 3
7. Q to Q Kt 3	Q to K 2
8. Kt to B 3 *(a)*	P to B 3
9. B to K Kt 5	P to Q Kt 4
10. Kt tks P	P tks Kt
11. B tks Kt P (ch) *(b)*	Q Kt to Q 2
12. Castles (Q R)	R to Q sq *(c)*
13. R tks Kt	R tks R
14. R to Q sq	Q to K 3 *(d)*
15. B tks R (ch)	Kt tks B
16. Q to Kt 8 (ch) *(e)*	Kt tks Q
17. R to Q 8 mate.	

Notes

(a) B. takes P (ch) followed by Q. takes Kt's P., might have been played with advantage, but the line of play adopted by Mr. Morphy led to something much more decisive.

(b) The natural move here was B. to Q's 5th, and most players would have adopted it, but, as will be seen on an examination of the position, the young champion devised a scheme of attack altogether superior to the one suggested.

(c) Can any better move be found?

(d) There is no resource.

(e) This sacrifice adds greatly to the beauty of the whole combination, and produces a most artistic finish. The student will do well to look closely into Mr. Morphy's 10th move and those that follow, which display a depth and accuracy to which too high praise cannot be awarded.

Enigma

BY R. BLUMENTHAL.

White	*Black*
K at K B sq	K at K Kt 5
Q at Q R 8	
B at K B 7	
Kt at K Kt 2	

White to play and mate in two moves.

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„ „ Ismailia ...	14	11		

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The Mediterranean Naturalist.

Contents-April.

		PAGE
1	The recent Earthquakes in Zante—W. G. Forster	347
2	The Future of the Races	354
3	Variation in Skin Colour	354
4	The Marls and Clays of the Maltese Islands—J. H. Cooke, B.Sc., F.G.S.	355
5	*Science Gossip*:—Earthquake in Sicily—*Helix aspersa* among the Maltese Oranges—Bee stings as a cure for rheumatism—Maltese Figs—The Maltese Dog—The land tortoises of the Galapagos—Natural history of Madagascar, etc. etc.	358
6	The Sandgate Landslip—W. Topley, F.R.S.	360
7	Metereological Report for the month.	362

Contents-June.

		PAGE
1	La Botanique du Nord-Etbai—E. A. Floyer	363
2	"Falco punicus" in Malta—N. Tagliaferro	366
3	Animal plagues	367
4	The Malta Potato Disease	367
5	The Effect of Pressure in causing a thinning of soft strata—G. J. Burns, B.Sc.	368
6	The Worlds Coal Supply	369
7	On the Slugs of the Maltese Islands—A. Caruana Gatto, B.A., LL.D.	370
8	The Street of Duels	373
9	Diamond making	374
10	The Marls & Clays of the Maltese Islands—John H. Cooke, F.G.S.	374
11	City Dust	378
12	Geological Notes on Acireale—G. Platania	379
13	The Pola Deep Sea Exploration	380
14	On the occurrence of lignite in the *Globigerina* bed of Malta—N. Tagliaferro	380
15	*Science Gossip*:—Do glaciers excavate?—The Peronospera in the Mediterranean—Irrigation—Flies and Cholera—Causes of modern debacles—Maltese Aphididæ and their foes—Origin of stars—Vandalism in Malta—Earthquakes in Malta—Leprosy and fish-diet—A new Botany—Electric farms—Prehistoric music—Survey of Greece—Curious roofs—The forms of eggs—The navigation of the air—A radio-micrometer—The moth as a chemist	381
16	Maltese Meteorology	386

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A Review of Natural Science.

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CONTENTS.

		PAGE
1	Wanted—A museum for Malta	387
2	Artificially coloured flowers	389
3	Petroleum Theories	389
4	Resoconto di una escursione fatta alle grotte di Isoverde in Liguria da Emilio Balbi ed A. Caruana Gatt	389
5	On Fuligula rufina in Malta—N. Tagliaferro	391
6	City Dust	392
7	La Botanique du Nord Etbai—E. A. Floyer	392
8	The Orange Disease in Cape Colony—S. D. Bairstow, F.L.S.	394
9	Colours of Ancient Egypt	399
10	A Modern Golgotha—Minnie Cooke	400
11	The Collection and preparation of foraminifera—E. Halkyard, F.R.M.S.	401
12	Deep Sea Exploration in the Eastern Mediterranean	402
13	On the Occurrence of Concretionary masses of Flint & Chert in the Maltese Limestones. J. H. Cooke	403
14	*Notes and News.*	405
15	Maltese Meteorology	410

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To Correspondents.

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A Museum for Malta.

The number of the systems of education that are now in vogue in Europe and America is legion; but numerous as they are, and varied as are the methods that are adopted in the working of them, it requires but a cursory glance to perceive that they all possess something in common which tends to induce between the advocates of each system a sympathetic and helpful spirit towards one another. They have universally adopted the same ideal, an ideal the essence of the spirit of which is *life*, rather than *livelihood*,—an ideal that requires them to impart a *generous* education such as is worthy of the inherent worth and dignity of man, and which at the same time affords the means for the development of the *humanity* of every individual of the community.

This principle is now so generally recognized that there is no country of importance where adequate provision is not made, not only for those branches of education which train the individual in the best methods for acquiring wealth, but also for that which has for its aim the general enlightenment of the masses.

In every city of Europe institutions in which the main object in view is the cultivation of powers of accurate observation, and of habits of careful enquiry are now recognized and supported as constituting an important factor in the education of the people.

Museums of various descriptions have been formed in which collections of natural products are carefully and systematically arranged, and accompanied by all particulars relating to their properties, the purposes to which they can be applied, and the processes whereby they may be rendered the most serviceable: the whole being presented in such a manner as to be intelligible to the average intellect. Institutions of this descrip-

tion not only afford incalculable aid to commerce and industry; but they also serve to stimulate scientific enquiry respecting the capabilities of the country as regards its natural and manufactured resources.

Dependent as Malta is upon her commerce, and upon the general intellectual efficiency of her people to enable them to compete with the cosmopolitan thousands with whom she trades, surely it is as great an anomaly to find her without an institution of this kind as it would be to find a country, whose safety depended upon the efficiency of its warlike defences, without an army or navy.

But apart from the utilitarian aspect of the question, Malta should possess such an institution in order that the people might be afforded an opportunity of learning the precise nature of the history of their country, and in order that their horizon of thought might be broadened, and their intelligence quickened.

The material that the islands afford for the study of the natural and civil history of the central Mediterranean is practically unlimited in extent, and inestimable in value: and yet, save for the work that has been undertaken by a few foreign enthusiasts, and by one or two enlightened natives no interest has been, or is, evinced in the collection and study of it.

It is a significant fact that while most of the principal museums of Europe possess some relic or other bearing on the former history of these islands, relics, that are cherished by their foreign possessors, and that are accorded a place of honour in the institutions of the country, in Malta such treasures are not only regarded with indifference, but when found, they are absolutely neglected, and are allowed to be dispersed into the collections of private individuals or else are relegated to some unsavoury room where the restrictions with reference to entrance, time, and similar details are such as to render them inaccessible to the average would-be student.

The islands have supplied, and are still continuing to supply some of the rarest and most unique geological, anthropological, and archaeological specimens to the museums of other countries that those institutions can be said to possess Few seasons pass by without some important discovery being recorded; and few seasons pass by without some disgraceful act of despoilation and vandalism being perpetrated by the ignorant country people. It is a standing reproach to the people of Malta that they should possses so little of national pride as to allow such a state of things to exist.

Alluding to this subject in his report on the discoveries at Notabile in 1881, Dr. A. A. Caruana strongly urged the necessity of forming such a museum; but unfortunately his proposal met with but little success.

Malta requires a museum. Why has she not one. It is not the assigning of a room, or of a series of rooms, fitted up with a few shelves and cases, and stocked with a heteorogeneous assortment of scientific odds and ends, the greater part of which are unarranged, undetermined, and ill prescrved, while the remainder are arranged in an unsystematic and antiquated fashion, that meets the needs of the case.

Malta requires an institution that is worthy of her as an important commercial centre; worthy of her people as an intelligent, enlightened race, and worthy of her past and present history which is as ancient and as honourable a one as is that of many a more extensive and pretentious state.

Her present need affords an opportunity for some liberal minded, public-spirited individual to come forward and earn the approbation of the present generation and the gratitude of future ones by providing the funds for the erection of a suitable edifice in which the treasure—trove of the islands, utilitarian and scientific, can be systematically arranged and effectually protected. Where the people may be able to obtain a clear and an adequate idea of the nature and extent of the resources of the country. Where the intelligent student may, by means of its well arranged collections be able to verify and compare the various stages of the islands' natural history. Where by means of the collections of the islands' archaeological treasures he may be able to obtain a thorough and practical knowledge of the civil history of the islands in past ages; and where he may have the means at hand whereby to form a just estimate of the habits and characters of the former inhabitants of the islands. Where, in short, individuals might go, and while finding rational amusement of an elevating character, they might, with an

unappreciable effort, educate themselves. This is the kind of institution that is now required to supplement the utilitarian education which is provided by the present system. It would afford the means whereby an education would be given such as would fit a man for the duties of good citizenship; and it is therefore incumbent on the people to see that provision is made for it.

To cease to provide the means for intellectual culture after the boy has taken on himself the cares and responsibilities of life is as grave an omission as would be the neglecting to provide nourishing food to an infant after it had been weaned from the mother.

What the one requires for the making of a robust physical framework, the other requires for a vigorous mental one. Such an institution as this must not therefore be regarded as a luxury; it is a necessity.

Who will supply it?

Artificially-Coloured Flowers.

Green flowers have been exhibited in florists' windows in Paris, and have excited a great deal of curiosity. The colouring however is not natural. A well-known chemical fact is that roses, periwinkles, and other flowers are quickly bleached in the fumes of burning sulphur; and a French chemist discovered nearly twenty years ago that a mixture of ether with a tenth of its volume of ammonia will instantly turn many red and violet flowers—such as the violet, red geranium, red and pink roses, and heliotrope—to a bright green, and change flowers of some other colours to yellow or black. The flowers now shown are colored in a different manner—by liquid absorbed through the stems. The process was discovered by a florist who carelessly dropped some colouring matter into a vase; and it consists in placing a little soluble aniline dye in water and immersing the stems for twelve to forty-eight hours. When malachite green is used, the carnation is turned to a deep green, and the narcissus become of the same colour. Beautiful pink and blue colours may be produced also by using, respectively, a solution of eosine and one of methyl blue. Flowers of certain natural colours are made to assume different tints, yellow jonquils being transformed by the green dye into greenish jonquils of singular appearance, and violet anemones becoming blue. These beautiful effects—capable of brilliant showing in tri-colored bouquets—have suggested that interesting experiments may be made by applying various colouring subtances to the roots of the growing plants, when striking results might be expected.

Petroleum Theories.

Few unsolved chemical problems have a greater interest than that of the formation of petroleum, as the discovery of the true origin would show us whether this valuable product is being rapidly exhausted, or whether, as has been plausibly suggested, it is still being formed in the earth. Various possible solutions have been offered. Mendelejeff supposes petroleum to result from the decomposition of an iron carbide by steam, ferric oxide and a hydrocarbon being produced; Sokoloff from a combination of carbon and hydrogen; Ross, from the reaction of hydrogen sulphide and calcium carbonate; Daubree, from the decomposition of vegetable matter. A later view is that of M. Engler, who believes it to be due to the decomposition of animal substances. This belief is supported by laboratory experiment, as it is possible to obtain petroleum by distilling animal matter under pressure.

Resoconto di una escursione fatta alle grotte di Isoverde in Liguria

DA EMILIO BALBI E A. CARUANA GATTO.

Tra i bei giorni che il Congresso Botanico Internazionale di Genova del 1892 ci ricorda dobbiamo annoverare quello da noi passato ad Isoverde ridente paesello del Liguri balzi Appennini, ove il 3 Settembre ci recammo collo intento di esplo-

rare le interessante caverne del luogo e di fare caccia delle rare specie di coleotteri che vi si trovano."

Noi avremmo voluto estendere le nostre ricerche anche nel campo botanico, ma la stagione poco propizia, l'aridità dei siti e il taglio recente delle erbe a cui si aggiungeva il poco tempo di cui potevano disporre ci dissuasero dall'occuparci di ciò, e perciò procedendo direttamente per le grotte raccogliemmo soltanto quelle poche piante che incontrammo per via, e delle quale l'egregio Prof. Penzig, al quale ci professiamo assai tenuti, ebbe la gentilezza di favorirci le determinazioni. Queste sono:—

Linaria vulgaris Mill.
Epilobium Dodonaei Vill.
Serratula tinctoria L.
Buphthalmum salicifolium L.
Sâtureja Montana L.
Lathyrus sylvestris L.
Mentha aquatica L.
Betonica officinalis L.
Campanula trachelium L.
Thesium divaricatum Jan.
Eupatorium cannabinum L.
Salivia glutinosa L.
Calamintha grandiflora Moench.

Le grotte poi che da noi furono visitate sono quattro, tre già note ed una ancora sconosciuta, poichè per quante ricerche abbiamo fatte non ci fu dato incontrarne cenno in alcun libro già edito sullo stesso argomento.

Quelle note già vengono comunemente appellate "Tana del drago," "Tre tane," "Tana Balou." (1) L'altra che abbiamo avuto la fortuua di scoprire, non avendo una speciale denominazione neppure presso gli stessi terrazzani, venne da noi chiamata "Tana della cappella," per la somiglianza che ha l'interna sua conformazione colla navata di una chiesa.

Sta sul versante sud del monte che trovasi a nord del Bricco del Guano e la sua imboccatura è a forma di forno e si apre sopra un ripido e pietroso pendio. Vi si entra per un corridoio la cui bassezza non permette che di camminarvi carponi e pel quale si giunge ad uno spianato di piccole dimensioni, dalla volta crollata; ed è da qui che umida e buia la grotta si presenta come fosse la navata di una chiesa.

Data così una sommaria descrizione di questa nuova grotta passiamo a dire alcun che del materiale raccolto in ciascuna singola caverna.

I. Grotta del Drago — Discretamente vasta e accessibile solamente con l'aiuto di una scala e di corde. Le raccolte in questa grotta furono;—

Mammiferi—Chirotteri— *Rhinolophus ferrum-equinum.*
Mammiferi—Insettivori—*Lorex pygmaeus.*
Mammiferi—Rosicanti—*Hypudaeus arvalis.*
Amphibia—Tritonidae—*Spelerpes fuscus.*

Oltre alcuni ragni, acari, hyaline e poche farfalline. Nella succitata memoria del Dr. Gestro troviamo indicata questa grotta come albergante anche l'*Anophtalmus Ramorinii Gestro*, ma per quante ricerche abbiamo fatte non ci riuscì trovarvi questa specie nè in questa escursione nè in altre antecedenti già fatte da uno di noi (Balbi) per cui ha nostro credere l'*habitat* del suaccennato Anophtolmus non dovrebbe comprendere la Grotta del Drago.

II. Grotta delle tre tane—E di accesso assai più facile della precedente ed entomologicamente ben più ricca. In essa raccogliemmo:—

Rhinolophus ferrum-equinum dei mammiferi, e dei dei coleotteri:—

Carabidae—Anophthalmus Ramorinii Gestro in 10 individui.
Staphilinidae—Omalium Allardi Fairm., in 2 esemplari perfetti, ma d'un colore un poco sbiadito.
Silphidae — Bathyscia Murialdi Balbi, in 2 esemplari.
Bathyscia pumilio Reitter. in 25 esemplari.

Dipiù, raccogliemmo alcuni Tisanuri appartenente ai generi *Polydesmus*, *Craspedosoma*, alcuni ragni, acari e la stessa specie di Hyalina rinvenuta nella prima grotta. Abbiamo anche avuto l'agio di osservare alcune fasi della vita di questi voraci carabidi così poco noti. Scavato dunque con incredibile velocità un buco nel terriccio, l'insetto vi si introduce, lasciando sporgere solo la testa e le mobili antenne, e lì si apposta in

(1) *Per la descrizione di queste tre grotte vedasi la memoria del Dr. Raffaele Gestro, Vice-Direttore del Museo Civico di Genova, dal titolo—"Res Ligusticae—Gli Anophthalmus trovati finora in Liguria."*

agguato. Tosto che egli sente la sua vittima, che nel nostro caso fu un malavventurato ragnio, l'insetto gli salta sopra, lo afferra e tosto se nè disfà allontanando da sè i resti, per poi correre dinuovo a rimpiattarsi. Va poi per non detto che la nostra caccia procedeva a lume di candele e a forza di voltare sassi e frugare nel terriccio, sicchè con tutto il nostro interesse dobbiamo pure confessare che ci si stava discretamente a disagio.

III. Grotta del Balou — Questa è la più vasta di tutte e quella che riguardo la fauna coleotterologica offre più ampio campo. Per la più decisa descrizione di questa grotta crediamo doversi menzionare un corridojo che si trova a sinistra di chi entra, dell'altezza di circa 6 metri e facente capo in una cavità rotonda ove fra lo sterco dei chirotteri raccogliemmo numerosi esemplari di Bathysciae. Il tutto in questa grotta la raccolta ammontò a:—

70—*Anophthalmus Ramorinii Gestro.*
7— „ „ *Var.?*
50—*Bathyscia Pumilio Reitter*
12— „ *Murialdi Balbi.*
1—*Omalium Allardi Faurm.*
1— „ *Cavernicola Balbi* (2).

Senza menzionare i soliti ospiti trai Tisanuri, Arennidi ecc.

IV. Grotta della Cappella—Da questa abbiamo potuto anche aggiungere:

1—*Anophthalmus Ramorinii Gestro.*
10—*Bathyscia pumilio Reitt*
7— „ *Murialdi Balbi.*
1—*Homalota?*

Tenuto conto quindi che nostro scopo precipuo era stato quello di fare raccolta di Anophthalmus e Bathiscie si comprenderà che di fronte all'abbondante materiale raccolto noi avevamo ogni ragione ritornando a Genova, di non parlare che della felice riuscita della nostra gita, e, nella speranza di vederlo accolto dai nostri colleghi, di convenire che avremmo assieme scritto il resoconto dell'escursione che era a noi tornata così interessante, ciò che ora poniamo in effetto.

---

(2) *Vedi Balbi—Catalogo della collezione coleotteri. Genova 1892.*

On Fuligula rufina in Malta.

A Male Red Crested Pochard or Whistling Duck (Fuligula rufina, Pall.) which was shot at Marsascirocco in January 1892, has lately been presented to the Museum of Natural History of the Malta University by Mr. Edward Galea. It being the only existing specimen of that species of duck shot in the Maltese Islands, it form a precious addition to the Ornithological Collection of the Museum.

Although the bird, according to Giglioli, (*Avifauna Italica*) is common in Sardinia and Sicily where it breeds and is sedentary, no mention of its appearance in Malta was made by Schembri, and Wright only admitted it in his Catalogue with the following indication:—"A specimen was obtained on the 1st September 1861. I was only in time to secure the bill and legs, which were enough to determine the species; the rest had been consigned to the pot. "Mr. Tristram, I believe, has also observed it in Malta."

The species was determined with the assistance of Mr. Ruggiero Falzon, P.A. The bird, a very fine specimen of the genus known by Maltese Sportsmen as "braimla," deserves a visit by all amateurs of ornithology.

The Red crested Pochard, according to Saunders, a southern and eastern species, is a rare wanderer to the British Isles. It has only once occurred in Denmark and seldom visits the waters of Holland, Belgium, France or Switzerland; it is even very local in the Spanish Peninsula, being almost confined to the lake, on the last side and those of the Balearic Islands. In the Southern half of Italy it is not uncommon, and as already stated, it is also resident in Sardinia and Sicily. In Africa it nests in many of the lakes to the North of the Sahara, though it is very rare in Egypt.

Besides the *Fuligula rufina*, three other species of the same genus, viz F. *ferina*, Linn. (Pochard), F. *cristata*, Leoch. (Tufted Duck), and F. *Nyroca*, Güld. (Nyroca Duck) are given by Wright accidental or common as visitors of the Maltese Islands. The former two are very rare whilst the latter is very common arriving in the Autumn, Winter and Spring.

To the above a fifth species, the Scaup Pochard, *Fuligula Marila* or *Gesneri*, may be added, a male specimen of which, shot at the Saline on the 8th December 1869, may be seen in the collection of the Malta University.

N. Tagliaferro.

City Dust.

The result of the elaborate investigation of the dust of the streets of Naples. of which Dr. L. Manfredi has given an account are of a startling nature The number of microbes of all kinds was found to average 761,521,000 per gram or about 21,600,000,000 per avoirdupois ounce. In the cleanest parts of the city the number was only 10,000,000 per gram, but in the business thoroughfares the average rose to 1,000,0000,000, and in some of the dirtiest streets it reached 5,000,000,000 In this vast mass of life were many disease—producing microbes, and the healthfulness of the streets varied with the total number of microbes Tests of the infectiveness of the dust gave positive results in 73 per cent of the experiments. Of 42 cases of diseas induced in Guinea pigs by inoculations with the dust of Naples, the microbe of pus was found in 8; the bacillus of malignant edama in 4, the bacillus of tetanus in 2, and the tubercle bacillus in 3. Not all city dust has the microbe—breeding powers of that of Naples, but the difference is believed to be only in degree.

La Botanique du Nord-Etbai

par Ernest Ayscoghe Floyer

II

Je suis porté à croire que les choses se sont passées de la manière suivante:

Tant que l'Arabe n'avait de ressource que dans les vallées pour assurer la nourriture de ses chameaux il conserva pour eux ses arbres. Mais graduellement quelques Arabes prirent pied dans la vallée du Nil. Ils louèrent leurs chameaux aux fermiers pour le transport de la moisson, regagnèrent leur désert et en rapportèrent les arbres sous forme de charbon de bois. Ils échangeaient ce dernier article, comme aujourd'hui, contre du blé. Je crois que la fabrication du charbon de bois est une industrie récente dans ce pays.

Il ne semble guère possible de retrouver, dans l'histoire, à quelle époque le charbon de bois fut connu pour la première fois en Orient; ni de dire si ou signifie le charbon de bois distinct du bois à brûler. La même difficulté se retrouve dans d'autres langues orientales. Mais il est probable que le sens original de ce mot est "noir", et que la fabrication du charbon de bois dans les terres sémitiques date des temps préhistoriques. Pour son introduction en Egypte, l'on peut émettre l'opinion basée sur le manque de bois convenable dans la vallée du Nil. (1)

Il n'y a que les différents acacias qui fournissent du charbon de bois. Mais leur disparition pousse le chameau à se nourrir d'autres arbustes. Le chameau a bien vite épuisé, dans ces derniers, la partie qu'il peut atteindre; l'Arabe vient alors avec sa hache et taille les plus hautes branches. Seuls, quelques arbres supportent, dans ce pays de sècheresse, l'enlèvement continuel de chacune de leurs feuilles. Ainsi, près de Sighdit, il y a de tristes amas de troncs de Balanites dénudés, taudes que tons les troncs de *mai* ou *Moringa aptera*, dont la vallée recoit son nom, ont disparu. Ces deux plantes: la *Moringa aptera* et balanites forment un excellent fourrage pour les chameaux. Les principaux arbres des vallées de l'Etbai sont les acacias. Parfois, sur un parcours de deux ou trois milles, on rencontrera, dans une vallée, cinquante ou soixante acacias par mille, en parfaite croissance. Leur proportion par rapport aux autres arbres peut être approximativement établie comme suit:

Acacia Seyal	60
Acacia Tortilis	20
Autres espèces d'acacias	10
Balanites	2
Moringa	2
Leptadenia	4
Calligonum	2

(1) *Le docteur Budge écrit que contre cette théorie s'élève l'existence sur les temples d'esquisses faites avec une substance qui paraît être du charbon.*

En choisissant parmi les fourrages secondaires des chameaux, il y a la *Basilla*, qui nourrit à peine seule, comme d'ailleurs le *Panicum* la *Crotalaria* et toutes les autres plantes plus petites. De même qu'en l'absence de la *Salicornia*, le chameau Baluchi paît sans aucun profit, de même le chameau arabe, s'il n'y a pas d'acacia, ne retire de ses pâturages qu'un avantage fort minime.

Une description de ce qui se passe aujourd'hui sera probablement une description fidèle de ce qui s'est passé, sans interruption, pendant 1200 ans. Le cours des choses a été interrompu de temps à autre pendant des périodes où la vallée du Nil n'était pas sûre pour les Arabes. Il est possible que la prospérité en Egypte, dont tout homme se réjouit, achève la destruction des arbres qui restent et ne laisse plus que le *Calotropis Procera* et les plantes dont se nourrisent quelques brebis et quelques ânes, surveillés par des pâtres vivant de céréales provenant de la vallée du Nil. Le chameau ayant alors pour ainsi dire brûlé ses vaisseaux, s'installera dans cette vallée, et il est intéressant d'examiner comment il s'y développera. L'énorme chameau du Caire est déjà un type distinct de tous les autres chameaux, les surpassant tous par ses proportions lourdes et massives.

En 1850, Bellefonds, voyageant dans le pays situé entre Assouan et Abu-Hamad, écrivait:

"Il y avait, groupés autour de nous dans les ravins, un grand nombre d'hommes, de femmes et d'enfants. Ils nous supplièrent tous de ne pas couper leurs arbres, qui formaient leur seule richesse; mais en réalité n'étaient venus là que pour mendier."—Je crois que Bellefonds a mal compris la situation. Ses hommes avaient sans doute coupé beaucoup de branches pour nourir ses chameaux et la prière de ces indigènes était naturelle. Elle me fut adressée bien des fois, ainsi qu'à mes chameliers, dont il n'y avait aucune aumône à attendre et qui cessaient toujours de couper quand on le leur demandait.

Dans les vallée pleines d'acacias, l'on trouve, suspendue á de fréquents intervalles, une longue houlette pelée afin d'être apercue de loin. Les enfants, suivis de de leurs troupeaux, se servent de ces houlettes pour secouer les feuilles. Un arbre, après avoir alimenté deux moutons continuera à croître; et voilà qu'un homme, armé d'une hache, détruira, en quelques instants, cet arbre qui aurait pu entretenir deux moutons d'année en année.

Colston écrit, en 1878, au sujet du Wadi Huda;

"Ce fut la première de ces riches et verdoyantes vallées que nous rencontrâmes continuellement dans la suite, pendant la plus grande partie de notre voyage. Ce Wadi était plein d'arbres, principalement d'acacias de l'espèce appelée par les Arabes *Seyal*. Nous y trouvâmes également une grande quantité d'arbustes et de plantes de différentes sortes, parmi lesquels on remarquait une espèce de genét appelé Murkh. (*Leptadenia Pharotechnica*)."

En 1891, cette vallée ne contenait que quelques *Calotropis* ne servant de nourriture à aucun animal, et quelques souches d'acacias prêtes à passer entre les mains du fabricant de charbon de bois.

C'est en remontant le Wadi Hullus que l'on peut étudier avec le plus de fruit la manière dont s'opère la destruction.

Le mot Hullus signifie une étoffe ou feutre étendu sur le dos d'un chameau; et la vallée forme un curieux conduit, allant d'un bout à l'autre du sommet de la longue chaîne qui s'étend de Hullus à Wadi Jemal. Ainsi l'origine du nom est apparente.

En quittant le Wadi Durunkat, nous nous engageâmes dans le Hallus et passâmes, sur un parcours de plusieurs milles, à travers des souches, déchiquetées d'acacias. Le propriétaire des brebis, qui doivent être prochainement transférées ailleurs, était établi dans la vallée du Nil. Nous vîmes une ligne croisant le sentier, et qu'une main avait simplement grattée sur le sol. A partir de ce point de magnifiques arbres, au bel ombrage, se dressaient drus et épais dans la vallée.

Au plus haut endroit, était campé un vieux patriarche, propriétaire de troupeaux bien nourris. Là, nous ne pûmes couper les arbres. L'hospitalité du patriarche se réduisait à permettre à nos chameaux de manger ce qu'ils pouvaient atteindre sans l'aide d'une hache. Cependant, en notre qualité d'étrangers, il nous fit une concession: celle d'accrocher les branches avec des houlettes et de les tenir abaissées, pendant que les chameaux mangeaient. En style arabe, ce vieillard s'appellait un "Kerhan," ce qui veut dire un er—mite du Nil. Il vivait là où avaient vécu ses aïeux pendant des générations, et parmi leurs nombreuses vallées c'était celle où la provision d'eau durait le plus longtemps.

Quand les pluies tombaient, il se dirigeait vers d'autres vallées, permettant aux arbres de celle qu' il quittait de croître, afin d'être en état lorsqu'il y serait ramené par la vallée avait été occupée par une famille dont la souche se trouvait dans la vallée du Nil.

Somme toute, il semble évident que la nature a créé dans la chameau un monstre qui, dans ce pays, la dévore continuellement et que ce qui s'applique à cette contrée, s'appliquerait également à toutes celles dont le sol et le climat sont susceptibles de produire des arbustes sauvages, mais non de supporter la culture. La nature, paraît-il, est lentement, mais sürement battue en breche par le chameau et par la hache, compagne inévitable mais imprévoyante du chameau. La nature cependant résiste avec énergie. Cette année, des pluies abondantes sont tombées dans les montagnes; les Arabes n'y ont répondu qu'en y envoyant paître un plus grand nombre de chameaux. Il est donc évident qu'une longue période de tranquillité dans la vallée du Nil aidera les Arabes dans leur œuvre de destruction, au point que les brebis et les chèvres devront suivre un jour l'autruche, l'âne sauvage et la vache, et que les Balanites disparaîtront comme le *Lehema* ou *Taberne montana*. Il y a plus de vérité qu'on ne le croirait de prime abord, dans le récit que font les Arabes aux voyageurs de la Palestine. Ils disent et c'est généralement pour plaisanter, qu'autrefois il y avait des lions en Palestine et qu'ils ont fui, effrayés par le chameau. Il est probable que le chameau a chassé le lion de la Palestine, non par ses grognements, mais en consommant les arbustes qui alimentaient les proies des lions.

The Orange Disease in Cape Colony

CERATITIS CITRIPERDA—(*Mac Leay*).
"*Orange Fly*," "*Trypeta Fly*," "*Peach Maggot*,"
"*Fruit Grub*," "*Apricot Worm*."

BY S. D. BAIRSTOW, F.L.S. (1)

A true naturalist is, among other things, a physiologist. A physiologist is, or should be, not only versed in the science of animated nature, but constitute himself an acute observer, a student of habits, haunts, appetites, modes of propulsion and propagation, structural peculiarities of strength and of weakness—strength to overcome or weakness to attack. Economic entomology deals more especially with those insects which are inimical to man's interests, and, in this branch of science—a useful and most important one—such points of study are vital and demand precognition. Discovery precedes, rectification follows. It would be pleasant to realise that every farmer or horticulturist has an elementary knowledge of natural history, sufficient to qualify him for combating ordinary pests. A little knowledge born of tuition is desirable before we adopt sweeping measures or sink into the apathy which springs from disgust and disheartening losses. In this country, I am compelled to submit, there is one huge encumbrance to be lifted. It is quite useless preaching methods of pest-removal and destruction, unless we first assure ourselves such measures are really needful—that Heaven help those who help themselves; that curses are not curses, but blessings disguised; teaching us to work, giving us power to overcome, and enforcing codes of cleanliness and pest-removal. We suffer to day what we need not suffer Long neglect has increased our responsibilities, but it is never too late to mend. Want of attention and ordinary care promotes the increase of injurious insects, and whilst species of *ceratitis* have not perhaps received invitation cards to wait upon orchard cultivators or fruit-vendors, they were not rejected when they came in ever increasing numbers—and they have prospered.

Ceratitis citriperda has no marked peculiarity of pedigree. Originally an egg, then a maggot, then a chrysalis, it poses finally as a fly or perfect insect. Belonging to the aristocratic order of *Diptera*, it lives as an insect of suction. The hind wings being absent, nature provides a pair of halteres, balancers or poisers, which assist in regulating flight. But *Ceratitis* is by no means an active, swift aeronaut, unless startled or pressed to action, preferring to "sail" upon its legs in an ambling fashion, a ship on wheels, amongst the sun-glinted foliage, rather than aimlessly dash amidst unfertile and uncongenial pastures. But it is quick enough on man's approach, and will calmly await a visitor or enemy, merely raising its wings in a curious, lazy

(1) *From the Agricultural Journal. Cape Colony*

characteristic, lack-a-daisical manner, until proximity betokens danger: then off it goes, and off again, cunningly tantalising, returning at times to very spot from whence it started, and renewing its crab-like sideways gait along the leaves. I know of no native fruit which has been found to be infected by this pretty pest, but it is a very old inhabitant of South Africa, and if not a native, must have been introduced by sailing vessels from some adjacent island (such as St. Helena) or other country. I knew it thirteen years ago in Cape Colony, when it had became a regular scourge of the Uitenhage fruit trees. The Right Rev. Bishop Ricards informed me that he remembered the maggot doing damage to fruit over forty years ago. I have been told that *Ceratitis* affects Kei apples in the wild state, but I am inclined to think without ocular evidence that a closely assimilating larva has been mistaken for it, hereafter referred to. I found the larva on pears and apples just before they dropped, but as a rule they scavenge fallen fruit. Prof. Mac Owan illustrates the *habitats* of *C. capitata Wied.*—most likely our identical fly—as as being Bermuda, East Indies, and Azores. We hear of it from Madagascar, Mauritius, Cape de Verde islands, Madeira, St. Helena, and nearly the whole of southern Europe. It is not yet recorded from the United States. A commercial traveller, on returning to his firm from a journey was speedily informed that one of his client's estate was in process of liquidation. 'Well!' said he, "Messrs. So-and-so are in for three times as much as we are!" "That's all right! returned his employer, "but it does 'nt pay our debt!" And thus, although we are assured other countries are in the same bight as ourselves and suffer disaster it does not make our troubles one whit more endurable. Certain does it appear to me that *Ceratitis* has been introduced through one of our Eastern seaports and has gradually spread through the midlands, southwards and westwards. I had intended drawing up a map to show its distribution but this is impossible, for with very few exceptions more or less frequent one year or another, I would undertake to find the pest in almost every Colonial town. Selecting a few towns from the Eastern Border districts we might roughly calculate according to information gathered from citizens and covering a space of five years that the following comprise a fair estimate of comparative attack, ranked in order of degree:—King William's Town, Uitenhage, Graham's Towns, Queen's Town, Graaff Reinet, very variable, Cradock, Colesburg.

This present season, through climatic causes, biting winds and changes to severe frosts, has been decidely unfavourable for *Ceratitis* in early fruits. Queen's Town appears to have had none at all up to the time I visited it in January, but on writing to Mr. F.H. Jones, that gentleman gave a sad record of its effect on later fruits. In Uitenhage I observed the fly working on apricots in the Rev Father O'Brien's garden last December. And in the month of October oranges in the Cradock districts were affected locally. In January, Aliwal North seemed very free from maggot. By the way this place struck me as being largely adapted for producing quantities of certain kinds of fruit. With others, much would depend on the quality and nature of the water supply.

I find that orchards in damp situations are most liable to attack, and that gardens on gravel ground are most free. The former lend assistance to pupæ in hatching, and provide excellent quarters for metamorphosis. The latter deter. Delicate, sensitive grubs, such as *Ceratitis*, cannot endure hot grit, and when they drop from the trees independently of, or together with the fruit, many must necessarily perish. Dr. Hansell *(Riversdale)* remarks: "The grubs are worst where the trees are not easily watered. Where the water is more available, the maggot is not so destructive." This is the only exception I have received to the rule laid down, but water-troughs and tree-rings cannot do much harm, for I dispute any preference shown by the maggots for the roots of trees, and I doubt the power of their instinct to impel them rootwards in the selection of locality. I dare not compare town with town, or district with district too minutely but should put Uitenhage in the front rank of infection, thus:—

1. It is naturally adapted for *Ceratitis* propagation.

2. I lived there, studied there, and found it badly infected.

3. It is on the line of a great fruit-growing industry.

4. It furnishes fruit for railway passengers, and is a considerable emporium of passenger and goods traffic.

5. As with other towns, little or nothing has been effected remedially.

6. Gardening on scientific principles is forging ahead here, and now is the time to pause, think, and act.

Ceratitis is distributed in the transit of fruit from place to place. I cannot regard the insect as a continuous, long distance flyer, but rather as a true type of Colonist, remaining where it alights and rearing family into family from generation to generation, so that where a lodgment is established here it sticks like a barnacle until displaced from the settlement. Mr. Hards of Grahams Town adduces an illustration of two orchards being divided by a fence. One is gravelled, the other overgrown with vegetables and weeds. The former provides Mr. Hards, who preserves fruit on an extensive scale, with four tons of non-affected peaches. The crop in latter orchard bearing just the same fruit was an utter failure; all the peaches proving maggoty. This fact speaks for itself, not so much on behalf of the gravel theory, as to prove that *Ceratitis* is really partial to its chosen habitat. How is the insect distributed? Firstly, no doubt by human agency. Secondly by larval migration. Thirdly by insect flight. We cannot stay the last, but we can prevent the two former. The fruit in Queenstown, when I was there, seemed remarkably free from maggot. Down the line at Tylden, Waku, &c., native girls were selling maggoty apricots by the dozen to passengers in the train. These being discarded as unsound are thrown here, there, and everywhere and much of the decaying, affected fruit fouls the carriages. The grubs drop out, jump or spring about, bury themselves in crevices and when hatched, are compelled to seek food where instinct guides. Hence distribution between Queenstown, Aliwal, King William's Town, East London, and up to the Free State. Queen's Town was punished during the latter end of the season. Whence came the maggots? Cannot this system of fruit vending be stayed, and a certain means of dispersal be wiped out? I have also found the larvae between the cushions and backs of carriage partitions. I have also found the pupae, in decayed early oranges stacked in a fruiterer's shop. Although the grub can only spring, at most, a foot at a time, it is enabled by successive leaps to travel a fair distance. I have seen four or five emerge from a plum, whilst it still adhered to the bough and after remaining quite stationary fifteen or twenty minutes on the rind skip trustfully to mother earth and find a place of repose. I do not think it is essential therefore for the maggot's safety that the fruit should fall, and when grounded, offer an opportunity to escape and burrow beneath. If so. of what utility *is* this power of springing? Corroborating this surmise, Mr. Geo. Kiug of Bedford says "At times they drop on the ground before the fruits reach the ground, but not always."

There is a small grub, closely resembling the peach-maggot in its habit of dragging or ripping the body of an apple, until it becomes pulpy—which has been, and may easily be mistaken for that species in the larval condition. We generally find it in decaying fruit, or that which has been previously parasited by such insects as *Heliothis Armiger*, *Hub*, or *Carpocapsa Pomona*, the dreaded Codling moth, but it has been despatched to me from Graaff-Reinet, attacking an apricot before its fall to mother earth. I have previously referred to this grub, which was identified as *Soronia-nov. sp?* by Mr. L. Peringuey, who states that it had been positively seen by one of his correspondents in the act of depositing, and I have myself repeatedly mistaken a young grup for *Ceratitis* as their destructive economies are similar.

Decaying fruit already parasited, and abandoned when fallen to the ground, contains many scavenging or clearance fly and beetle larvæ, or even imagines a perfect insect. I should have thought this scavenging principle was part and parcel of *Soronia's* mission in life. Allied species are usually considered to favour the bark of trees, galls, and decaying vegetable matter. A very small beetle, *Carpophilus spec. (fam. Nitidulidæ)*, is commonly found busily working amongst the decaying and rotten fruits. Mr. Peringuey, who also named this species for me, says,: "Found occasionally in decaying fruit and also, but seldom, on the flowers of the banana." My experience in the Eastern and Midland districts is that our decaying fruits are

seldom to be found without it, and it is a true friend of man, assisting in preserving an universal sanitary equilibrium, by removing health-destroying effluvia, arising from obnoxious gases caused by putrefaction. I have this species also from Natal. Sound fruits falling to earth rapidly degenerate into a reeking mass of insect life. We find several *Coleopterous* and eipterous insects engaged in the task of removing deleterious debris. I mention this, as there is an apparent danger of our mistaking friends for enemies, and *vice versa*—a result we are endeavouring to obviate. The larva of *Soronia*. is dirty grey, tinted with pink in mature specimens: dorsal area distinct and finely striated with dark grey: on each segment two large irregularly shape black spots, and smaller ones on either spiracular line. Head conspicuous, shining, two large colliding black spots above the face and black spot between horns. Anal flap has a bifid, horny process protruding from center of segment; length about $\frac{1}{2}$-inch. To an inexperienced eye the larva of *Soronia* might easily be mistaken for *Ceratitis*.

The greatest difficulty in the pleasant task of peeping into the private affairs of *Ceratitis*, has been to find the egg. Hours upon hours have been devoted to slicing up fruits of various kinds into their strips and separating the tissues, covering them with water, oft repeated, placed upon a glass dish. I had looked for a granular oval particle of floating matter, looked in vain, and foolishly. Common sense should have thought that the very construction of the parent mother's ovipositor—which is mentioned in its proper place—precluded the idea of a rounded object. I had seen the fly scores of times,—as I imagined—in the act of laying her eggs. My imagination was not defective, but my slicing system was at fault. In a narrow lane adjoining my house there exists, as must have existed for many years, a solitary peach tree underneath whose shade I have spent spare time in watching the fly at work. One stout female demonstrates quite clearly that a crisis in her life has arrived. She is fussing about from place to place, bough to bough, leaf to leaf and there she goes plump on on the top of a fine peach. One, two, three stab with her ovipositor. Off to another, repeating the process twice again. I take the three peaches into my study and carve out each visibly perforated portion and separate the particles as before." And I find them at last, the eggs of *Ceratitis*, occuring in millions yet to my knowledge never before known. After completing this interesting discovery to my satisfaction, I forwarded one or two specimens to Dr. Chute for examination, and I cannot add nothing to the diagnostic solution given by my confrere, to what had appeared no easy problem. He writes: "You sent me a little glass vial, and asked me to look for the egg. I examined it carefully by microscope, and there was a case with a maggot fitting tightly inside. It appeared to me ready to hatch. These flies cannot have eggs like moths and butterflies which are deposited some time before they hatch, for the nature of the tissues in which they are laid would, I should imagine, preclude the possibility of the containing larva living. May it not be that these flies, after impregnation, retain within the abdomen the fecundated eg, which within the maternal body becomes developed nearly to hatching point, when the mother seeks the ripening fruit, and with her formidable ovipositor —a tube sharpened at end—deposits the larva case, with its nearly full grown maggot, which almost immediately cuts its way out with the sharp hooks?" With regard to the immediate hatching I found the eggs aud infant larva together. The earliest stage, then of *Ceratitis* is a longitudinal centre bent, whitish, Isabella-shaded, shrivelly, torpedo-shaped, embryonary sac. Dr. Chute further reported on a small consignment of female flies as follows—

"You sent me a parcel of three females, two were perfect, and one had the abdomen missing These flies I put into a test-tube, and was boiling them in preparation, when I noticed some little white bodies floating about. These when the fluid was at rest sank to the bottom, and I withdrew them with a pipette. Upon examination in a watch glass they were five in number, opaque milky-white, long, ovoid, torpedo-shaped bodies blunt, pointed at one end, the other end drawn out slightly to a nipple. The contents were disorganised, but in the dark granular contents were at one end conical, and at its apex were visible two little dark objects, very like the curved, sickle-shaped cutting-hooks of the larva I then examined in a watch glass the three flies

from whence the bodies dropped. Two were perfect, in the other the abdomen was missing. In the abdomen of one could be seen a torpedo-shaped body; in that of the other, four of these bodies were visible." Thus we have now all the information required to satisfy us that we cannot profitably look for a means of preventing future progeny by remedial measures against the female's mode of depositing her eggs, nor in attempting to destroy the eggs, themselves, for two very simple reasons:—

1. When the egg is once inside the fruit, we we cannot get it out without destroying the fruit.

2. As the fly is breeding right away throngh the season, we should have to spray day by day to prevent oviposition being effectively conducted and even then we assume exterior treatment is beneficial, a position I hold to be untenable in this instance.

The eggs are laid to a depth of over three millimetres, but each egg deposited in the same fruit seems to be placed at a higher or lower level than its respective fellows. And there is no hard and fast rule as to how many eggs are deposited in each fruit. Much depends on the size of the fruit, its condition, and general character. Much depends on the insect's instinctive appreciation of a fitness of the surroundings, but it is worthy of note that I have not found an instance of only one egg being deposited singly.

In the larval stage of this insect we cannot determine the sexual difference, nor yet in the pupal stage, and in neither is the insects capable of producing its kind. It has a complete metamorphosis, that is to say, the chrysalids lack locomotive power and do not feed. Some insects protect their eggs until they are hatched, others—like our subject—drop them into the food-area and leave them for ever. It is an error to fix the time of depositing ova, through the rind of fruit and the period just before ripening. By common practice a rule may be said to have obtained but I can discover no restriction herein. I have found very minute maggots in a hard, green clingstone peach, where no orifice was casually visible, and where their presence could only be ascertained by opening the fruit: Mr. Pym sent me specimeus of maggot in a fresh plucked, green, hard, ordinary bakizg apple. Insects are not always bound by hard and fast rules. One caterpillar will eat its way through a cardboard or wooden box, whilst another of similar age climbs up the inside and tumbles off the summit. Fitness of circumstance and accessibility of food are highly suggestive, whilst much depends upon the seasou and state of incoming fruit.

"I have known the fruit to be perforated in some years when it was only half grown; in others, as the fruit is ripening."—*G. King, Bedford.*

"The female fly certainly bores a small hole or holes, and deposits its eggs just previous to ripening."—*Captain Norris-Newman.*

"I have noticed a fly, something like a mosquito sitting on the peach when it is nearly ripe, and after it has gone a drop of juice has appeared on the spot. I believe the fly must have a means of piercing the fruit and laying its eggs close to the core, and that the drop of juice exudes from the puncture. On breaking the fruit open I have not been able to trace the puncture or find the eggs but they may be very small and have the same colour as the fruit"—*H. Weakley.*

"Yes, most decidedly, she deposits before the fruit ripens."—*C. A. Pym.*

"She lays justs before the the fruit ripens, so I presume."—*Hards.*

"The egg, I think, is deposited some little time before the fruit ripens; if there is a little raid, you can see a long string of gum attached to the fruit, that has exuded from the punctures made by the female fly in peach and apricot. I don't find any difference in the depositing of eggs in Freestone and Clingstone."—*Anon. Graham's Town.*

"If ripe fruit is plentiful, the eggs are deposited after the fruits being to soften; if scarce, they are deposited in hard fruit, but do not make such rapid progress, and in winter, when no fruit is to be fouud except oranges, the eggs are often deposited in half-ripe fruit to fall."—*J. R. Sims.*

"I believe the fruit is punctured just before it ripens."—*H. Pocock.*

"General opinion has it that eggs are deposited when the fruit is still very green, and not when it is nearly ripe, especially with the nectarine, as the grub is found in it at a very early stage."—*Magennis.*

We may take it finally, then that there is no fixed law as to whether the eggs are laid in green or ripening fruit, although the balance of opinion amongst fruit growers favours that latter theory. I have inspected a peach tree in Cradock without discovering attack; whilst a week later most of the fruit is touched and maturing larvæ conspicuous. Therefore, the young maggots must have been contained in the green peaches, which also must have held the ova, when still more juvenile. Besides, the very structure and nature of a female's the ovipositors strikes one is being too sturdy, simple to be used in piercing a weak spot or ripening matter. By taking a maggot away from a semi-ripe peach, and placing it in a hole cut in a hurt green one, we shall find it burrow downwards and inwards in a twinkling, and there remain and feed until adult. Or by slicing a green peach into small portions and placing them in water upon a glass dish, very many minute larvæ, and even discarded skins, can be discovered, leading us almost to believe that at certain seasons all peaches are attacked more or less, and by reason only of their minuteness do they escape observation. Mr. J. B. Hellier says: "The maggots are never found in green apricots, such as are used for making pies...." Perhaps the foregoing experiment was never attempted. Certain it that the worms are most often to be found in ripening fruit. I admit the importance of this concession. Mr. Hellier says: The perfect insect may be seen flying about very swiftly, and depositing some half-dozen eggs in a fruit." With apricots and lesser fruits this is perfectly correct, but the female fly adapts herself to circumstances and in larger fruits, such as pears, will deposit more in proportion. In the garden of Mrs. Phillips (Cradock), from one magnificent saffron pear I extracted no less the than seventeen maggots, and one large fruit held two broods, affecting it on both sides. Most of the larvæ ultimately find their way to the stone of an apricot or peach: some drive down immediately after hatching from ova: others, as if deterred by acrid premonition, work all around some selected spot. The excrement of a grup would do more to foul fruit-tissues than the simple feeding on it. The grub is fairly hardy and active, and after finding a likely grave for transition, passes into the pupal stage within a couple of days. Where soil is of a clayey, cakey nature, rising up in cracked flakes from the surface, there is the favourite hiding place for the maggots. They cover an extensive range and are often found away from their tree host, so that the roots may often be examined for specimens without result. This answers a hundred interrogators who ask: "Where does the chrysalis get to? I cannot find it in fallen fruit. It isn't in the bark of the tree. I have dug at the roots and never found one." No, we might dig for a year and never find one! I find it difficult sometimes to discover where the imps have stowed themselves away in either my large outside vivarium or house breeding-cage Unfortunatly this fact removes that which would otherwise prove an important means of destruction --digging at the roots or applying chemical manure, sousing with insecticides, or upheaving and burning dried leaves. I once heard described a man's fingerswhich were attenuate and knuckle-prominent as "sausage skins stuffed with buttons." The white slimy skin of our maggot seems naturally provided as a sac to cover a lot of disarranged and bulgy, mobile intestines, and the worm is happiest when most externally slippery. The late Professor J.O. Westwood in his paper* on this "Orange fly" (*Gardener's Chronicle*, Sep. 9, 1884) thus describe the maggot:—"The larva is a white fleshy grub destitute of legs, very similar to that of the celery-stem fly, and like it it possesses two small contiguous hooks at the front of the body, which it alternately protrudes and retracts, thereby tearing the delicate membrane in which the drops of juice are contained. The body is gradually attenuated in front, very distinctly articulated; the anterior segments including the head, are retractile. There are generally several of these larvæ in each orange, and when removed and placed upon a flat surface, they have the power of springing to a considerable distance, in the same manner as the well-known cheese-maggot. When full grown they eat their way out of the orange and undergo the change to the pupa state on the outside."

(To be continued).

Colours of Ancient Egypt.

The pigments used by the ancient Egyptian 4000 to 6000 years ago were few and almost all repre-

sented what have been called primary colours. Red seems to have been most used in the outside decoration of buildings. Giving results of an investigation of Mr. Flinders Petrie's specimens, Mr. W. J. Russell states that the red pigment was a ferric oxide, an oolitic hematite, with a little clay,—the proportion of ferric oxide varying from 70 to 80 per cent. It was a natural pigment, unaffected by sunlight, heat or acids. Another colour was a dull yellow, and this also consisted of oxide of iron, combined with alumina, lime and some water—being essentially a kind of coloured clay. A reproduction of the mixture was fadeless in light, but was changed by heat. An orange about 4000 B.C. by one of the first pyramid builders, was a mixture of the red and yellow. The maker mixed his colours with gum. A very bright yellow contained arsenic, and was in fact orpiment, which is now produced artificially. Beaten gold was the mineral called chrysolite; but in later times a kind of glass or frit coloured with oxide of copper was used, and gave various shades. It could be rubbed down in a mortar, and was probably applied with gum. The white pigment used was sulphate of lime' known also as gypsum and alabaster. A pale pink color contained 99 per cent of sulphate of lime, the rest being an organic compound believed to be madder.

A Modern Golgotha.

One by one the links that bind us to the past are being broken and slowly but surely old-world customs and manners are being relegated to a limbo of well merited oblivion. There is perhaps no people in Europe more conservative, more tenacious of its traditional customs and manners than are the Maltese, but even they are now giving way before the irresistable, onward march of science and common seuse, and are adopting the new *regime*.

In common with most European nations they formerly interred their dead beneath their churches, and it was to this cause that much of the disease and death that formerly devastated the islands was due. On the continent, the practice has been in abeyance for many years whereas in Malta its suppression is of quite recent date. A few years ago the British Government caused a large cemetery to be built outside the fortifications and to this the contents of most of the charnel-houses were taken and buried. A few churches, however, escaped the edict among which may be mentioned the subterranean crypt which is situated beneath the Monastery of the Capuchins at Floriana, a suburb of Valletta. This Modern Golgotha was in existence, and could be visited by any one up to within 12 months ago, upon obtaining permission, from the prior. It consisted of a vast subterranean chamber, with numerous galleries branching off from it, the walls of which were hollowed into niches in which the dead bodies of the members of the confraternity who had died in the institutian, were placed. After death the corpse was disembowelled, and hermetically sealed in a small heated chamber having a perforated bottom where it was left until quite shrivelled and dry, after which it was dressed in its monkish robes and chained in an upright position in the niches where it was left to decay. To the casual visitor the appearance presented by these specimens of decayed humanity was most weird and awful. On many of them their garments hung in tatters exposing the skeleton limbs beneath, while others had their garments still intact but exhibiting ghastly shulls either wholly or partially denuded of every vestige of flesh. Some stood bolt upright others leaned forward, while others again had dropped to the length of their chain and hung from it in the most grotesque and fanciful postures. When they were in such an advanced state of decay as to literally fall to pieces the skull and bones were collected and were affixed to the walls thus forming a kind of ornamentation which was quite in keeping with the gruesome surroundings. There were nearly two hundred of these grim figures around the walls when the edict was passed for their dispersal about eight months ago. Formerly the place was open to the general public on the second day of November, upon which occasion great numbers of people flocked to the vaults to perform their devotions. Restrictions were afterwards placed upon the time of entrance, but still no difficulty was placed in the way of those who desired to visit the place, and it has accordingly been a point of attraction for visitors to the islands for many years past.

Another curious example of a similar type was open to the public to within a few months ago. It was situated in Strada Mercanti, Valletta, and permission to see it was be obtained on application to the Comptroller of Charitable Institutions.

In former days the deceased patients from the hospital of the knights of St. John were buried in a cemetery that adjoined the hospital, and which was situated in one of the most populated districts of the city.

Sanitary considerations necessitated the removal of this burying ground, and early in the present century it was broken up and the human remains were collected and thrown in a promiscuous heap into an adjoining crypt where they remained for several years. In 1847-1848 the Rev. G. Zammit the chaplain to the Civil Hospital undertook to sort the bones, and himself festooned the walls of the crypt in all sorts of quaint and fastastic devices.

The bones have a peculiar interest attached to them as most of them are the remains of the soldiers of the Knights, who were treated in the hospital of the Order. This hospital was built in 1628 by the Grand Master Vasconcelos, and it was so well kept up by the Knights that the patients were served on silver plate the value of which was estimated at £ 3000. Magnificient, however, as were the hospital and its appurtenances, the philantrophist Howard, who visited it in 1786 gives us but a gruesome account of the manner in which the patients were treated. "The number of patients," he says, in this Hospital" during the time I was in Malta (March 29th to April 19th 1786) was from 510 to 532. These were served by the most ragged, dirty, unfeeling and inhuman persons I ever saw. I once found eight or nine of them highly entertained with a delirious dying patient. The Governor told one that they had only twenty two servants and that many of them were debtors or criminals, who had fled thither for refuge. At the same time I observed, that near forty attendants were kept to take care of about twenty six horses and the same number of mules in the Grandmaster's stables; and that there all was clean.

I cannot help adding that in the centre of each of these stables there was a fountain out of which water was constantly running into a stone basin; but that in the hospital though there was indeed a place for a fountain there was no water." At the present time this building is used as a civil hospital.

MINNIE COOKE.

The Collection and Preparation of Foraminifera

BY EDWARD HALKYARD, F.R.M.S.

III.

Fossil foraminifera which are embedded in soft shales or clay, such as Gault Clay, may be treated in the following manner. The clay must be broken into small pieces, say about three cubic inches in size, and dried thoroughly but not baked. If the dried clay whilst still warm is thrown into a basin of cold water it will soon become disintegrated and fall in the form of mud to the bottom of the basin. A portion of the mud must now be put into the gauze bag attached to the tin funnel mentioned before, and washed under a water-tap. The water flowing through the bag will carry with it the fine impalpable particles of mud, and in a short time the bag will contain only a small quantity of clean gritty material composed largely of foraminifera, sponge spicules and fragments of shell. This process must be repeated till all the clay is washed. It is better to put only a small quantity of clay in the bag at once, as with a large quantity the meshes of the gauze become partially choked up with the *floating* mud, and the water does not find its way through so easily. I also find it best to let the foraminifera, etc., collect in the bag till I have washed all the clay I intend to do, the water is then drained off and the whole apparatus placed near a fire to dry. When dry, the bag may be detached and its contents emptied out and stored for future examination.

The manner of treating the material obtained from the interior of flints is very similar to the one described above, but after the gathering is well dried it is necessary to get rid of the flakes

of flint which are very liable to cut the gauze. This may be done in a great degree by sifting through a coarse sieve, say of 10 meshes to the inch, which will retain most of the objectionable flint flakes. Do not, however, throw these flakes away without examination, for large foraminifera may be found amongst them. If the sieve does not prove satisfactory in eliminating the flints, there is nothing for it but picking out with a pair of forceps the flakes from the material spread upon a black surface. After this is done, warm the material on a plate before the fire and throw in into water as was recommended in the case of clay. The warmth and subsequent action of the water will greatly assist in cleansing the foraminifera by making more friable the calcareous particles adhering to them. Proceed then in the manner described above for treating clay containing foraminifera.

In many specimens thus obtained, the original carbonate of lime forming the shell has been so replaced by silica that they will resist the action of dilute hydrochloric acid. Advantage may be taken of this change, to further cleanse such specimens whose appearance is spoiled by the adherence of particles of chalk, but great care should be exercised so as not to spoil the specimen, and very weak acid should be used.

I will conclude this paper with a few hints as to the selection of foramifera from the "floatings" and "washings" resulting from the above-described processes. I myself use for the purpose of selection a Compound Binocular Microscope with a pair of "A" Eyepieces and a 2-in. Objective, as I find this power the most convenient being the lowest which enables me to get a good idea of the state of preservation of the specimens, and at the same time gives a good large field. My microscope has a large square stage, and the "floatings" are examined on a large slip (dimensions 4in. × 2in.) covered with ribbed silk, the ribs running the length of the slip. The silk is found of advantage in allowing the microscope to be inclined in a considerable degree without any danger of of the specimens rolling off and so being lost; to guard further againt this danger there is a border of thick cardboard glued around the slip. To pick up the foraminifera selected, a fine pointed sable brush is used, which must be slightly wetted and drawn to a point. The specimen having been picked up on the tip of the wetted brush, may be transferred to a 3in. × 1in. slip of cardboard covered with black paper which has been brushed over with a thin solution of gum and then dried. When a sufficient number of Foraminifera have have been collected on this slip, they may be sorted and permanently mounted for the cabinet in any manner the collector may desire.

I would beg to remind my readers that they cannot be too particular about the thorough cleansing of all apparatus after use, so as to guard against specimens from one locality finding their way into material from another place. Of course, this is very important when the question of distribution of species is entered upon. I find the best way of cleansing sieves and the tin funnel is to brush them when dry with an old clothes-brush and the easiest way to clean the gauze bags is to dry completely, rub between the hands, and shake then well. In my experience this is far more efficient than washing the articles.

Deep Sea Explorations in the Eastern Mediterranean.

The Deep-sea explorations in the eastern parts of the Mediterranean, which were continued this year by the Austrian Government, on board the *Pola*, were rich in interesting results; they are analysed by Prof. J. Luksch in the *Sitzungsberichte* of the Vienna Academy (vol. 100, 2nd division), and were briefly referred to in the "Proceedings" for December. Leaving the Adriatic at Cape Leuca, the *Pola* proceeded south to the latitude of Navarino; thence she ran south-east to Candia visiting also Cerigo Islands and Santorin. Sailing round the eastern part part of Candia, the *Pola* proceeded to Alexandria, west along the African coast to Ras Milhe, thence to Candia again along the south-western coast of that island, to Cerigo, Milo, and the Pyræus. The soundings during the cruise were extremely interesting, inasmuch as in latitude 35° 44′ 20″ and longitude 21° 44′ 50″ (about 50 nautical miles south-west from Cape Matapan) the *Pola* found the depth of

4,400 metres (2,406 fathoms), followed within a few miles further east by a depth of 4, 080 metres (2,236 fathoms), which are the greatest depths recorded in the Mediterranean. They have received from the Austrian Hydrographical Board the name of Pola Deep. The great depression of the Mediterranean must thus be shifted considerably east from its former central position on our maps. Another deep area was explored between Candia and Alexandria—the depths attaining from 3,310 metres (1,810 fathoms) some 20 miles south-east of Grandes Bay, and from 2,392 metres (1,208 fathoms) to 2,120 metres (1,322 fathoms) within a short distance from Alexandria; the maximum depth sounded being 3,038 metres (1,678 fathoms) in 28° 39′ 30″ north latitude, and 33° 19′ 54″ east longitude. The full result of the numerous and varied observations made on board the *Pola* will be published when all calculations have been completed; but several interesting facts are already indicated in the preliminary report. The highest temperatures were found in the first parts of the voyage, and are given as follows: From 80·8° F. to 69° in the first 50 metres (27 fathoms); from 69° to 62·5° in depths from 50 to 100 metres (27 to 55 fathoms); from 59° to 57° in depth of from 200 metres (110 to 547 fathoms) to 3,000 metres (1,640 fathoms). The lowest temperature (52½°) was observed at the issue from the Adriatic Sea, at a depth of 760 metres (415 fathoms); at 4,400 metres (2,406 fathoms) the temperature was 56°. It was observed last year that in the Central Mediterranean the density of the water and saturation with salt increased with depth, and the same was observed in the western part of this year's cruise. But in the Eastern Mediterranean the density of the water varies but very little in the different strata (from 1·0297 to 1·0300), and it is higher on the whole than in the West. The transparence of the water is very great in the Eastern Mediterranean; in three cases a white disc was seen down to a depth of 54 metres (177 feet) but it disappaared from view at a depth of 32 metres (105 feet) at the above-mentioned station in the south-west of Cape Matapan.—*Proceedings of the Royal Geographical Society, January, 1892.*

On the Occurrence of Concretionary Masses of Flint and Chert in the Maltese Limestones.

By John H. Cooke, F. G. S., etc.

The late Admeral Spratt, R.N., (1) and Dr. John Murray, (2) of the "Challenger" Expedition, have, in their brochures on Maltese Geology, made allusion *en passant* to the occurrence of chert nodules in the *Globigerina* limestones of the Maltese islands Neither of these gentlemen, however, gave any details of the nature, mode of occurrence, or distribution of the concretions, an omission which was probably due to the restricted area of the horizon at which the nodules are found, and to the irregular and sparse manner in which they are distributed.

The following notes on these points, which were collected in the course of my geological investigations into the fauna of the formation, may not, therefore, be without some value to present and future students of Maltese geology.

The *Globigerina* limestones in which the concretions occur occupy the second place in the ascending order of the Maltese formations. They attain a maximum thickness of about 250 feet, and comprise a series of layers or beds which vary in number in different localities from four to ten. Between the beds themselves the variations are but slight, and are of a chemical rather than of a lithological or a palæontological character, consisting generally of a greater or lesser percentage of carbonate of lime occording to the extent to which the beds were influenced by the river-waters which brought down detrital products from the surrounding continental areas.

The following table shows the relative position and the more prominent characteristics of the sub-divisions.

(1) "*This deposit often contains nodules of a flinty texture, viz., chert, in which are fish-scales.*" *The Geology of Malta and Gozo. Malta, 1854, p. 7.*

(2) "*Nodules of flint and chert are found in some of the layers.*" *The Maltese Islands, with special reference to their geological structure.*" *Scot. Geog. Mag., September, 1890, p. 24.*

It would be irrelevant to here consider these beds in detail; I shall, therefore simply regard the formation as being broadly divisible into three sections, *i.e.*

a. Deposits containing from 30 per cent. to 80 per cent. of carbonate of lime; the residue being principally made up of alumina with a small quantity of silica. Dr. John Murray considers this portion of the bed to have been formed on a descending sea-floor in about 300 fathoms of water, and to have been within the influence of river-waters and their detrital products.

b. Deposits containing from 80 to 90 per cent. of carbonate of lime. Probably deposited in about 1000 fathoms of water.

c. Deposits containing 70 per cent. and less of carbonate of lime; and consisting for the most of the remains of comparatively shallow-water organisms. These were laid down on a rising sea-floor, and in about 300 fathoms.

The *Globigerina* limestones may, therefore, be considered as being a series of deposits laid down during a gradual but constant change in the position of the sea-bottom, the deposits in division *b.* having been formed about the time when the maximum depression was being attained, and at a considerable distance from any shore-line.

In the lower parts of this intermediate division considerable quantities of siliceous concretions are found to occur in certain localities, of which the cliffs at Former Rih, the escarpments around the slopes of Uied Mars-el-forn, Uied Sakkaja, and Uied Hempisa, and the quarries of Tad-dual, Tal Gauchi and Inghieret furnish some of the most characteristic specimens. In none of the more impure varieties of limestone in either the upper or the lower divisions have any specimens been found.

The concretions assume a variety of forms occurring sometimes as irregularly shaped masses of two or more feet in length, and from six to twelve inches in thickness, or as spheroidally shaped nodules having more or less symmetrically shaped outlines. In composition they also vary greatly, the larger masses being composed of flint (silex), while the smaller nodular forms consists of chert, (phtanite,) which is an impure calcareous variety of flint.

At Former Rih and along the hill-slopes already referred to, the differential degradation to which the nodular masses and their matrices have been subjected has resulted in the complete isolation of the former, ann they have thus been caused to project from the faces of the cliffs and escarpments as bold conical bosses.

In none of the nodules are these exposed portions entire, as all of them have been more or less acted upon by the same meteoric agencies that have removed the limestone from around them.

In many instances the disintegration has proceeded by the peeling off of laminated scales, while in others small shapeless masses have broken away and left the weathered surfaces irregularly prismatic in character.

Viewed with the naked eye both the nodules and the larger masses are exceedingly homogeneous; but when examined under a low magnifying power, sections of foraminifera, small molluscs, and other organisms are to be seen embedded.

In none of the specimens that I have examined have I observed any of the fish-scales to which Spratt alluded in his brochure; but I cannot venture to say that, therefore, such remains are either absent or of rare occurrence.

In colour both the flint and the chert vary widely, graduating through all the intermediate shades of gray, fawn, bloe, and black.

The interiors of the nodules are generally of a jet black colour, a fact which is probably due to the presence of carbonaceous matter, as much of it disappeared when subjected to the action of the blow-pipe flame. This black interior often graduates into a semi-translucent grey towards the outer edges, thus causing the concretions when cut transversely to present the appearance of being made up of a series of concentric layers of varying hues; such specimens are not, however, so common as are the uniformly black, grey, and fawn coloured varieties.

The limestones surrounding the masses and the nodules is invariable changed into chert more or less pure in character. This cherty limestones is often of a colour similar to that of the enclosed nodule, and unless carefully examined it is often difficult to say where the line of demarcation between the two lies.

The former, however, is neither so compact nor does it present, when broken by means of a smart blow with a hammer, the conchoidal fracture which is so characteristic of the latter.

From the similarity which exsist besween the characters of these flints and cherts and those which occur so plentifully in other limestone formations, it seems probable that the origins of both are to be traced to analogous causes.

The Maltese varietes are found only in the most highly calcareus portions of the strata, embedded among the *Globigerinæ* of which the greater part of the formation is made up.

It was probable to the action of these and other organisms in eliminating the silica held in solution in the sea-water, and afterwards to chemical action whereby further precipitation of silica on and around that which had been proviously secreted by the organisms, that these nodular masses had their origin.

Geological Mag:

Notes and News.

AFTER long study of the earths political geography, Dr. A. Oppel has concluded that about 1,700,000 square miles are uninhabited or ownerless, and about 5,000,000 square miles more are without settled government. The remaining 45,000,000 square miles are occupied by 75 definite states, most of them so insignificant that the 18 largest take up 87 per cent of the whole area.

THE Phylloxera has appeared in the vineyards of the province of Trapani in Sicily in the vicinity of Marsala. This is the only province of the islands which has hitherto been free from the visitation. The districts in which the disease has manifested itself are Alcamea and Partinico. A commission has been oppointed to enquire into the subject.

DR. John Murray the celebrated *Challenger* naturalist has been awarded the Humboldt gold medal, which is the highest honour the Berlin Geographical Society can confer; and Mr. J. W. Gregory B. Sc., of the British museum has been promoted to the degree of D. Sc. by the University of London. Dr. Gregory's most recent work on Mediterranean Natural History was the revision of the Maltese fossil echinoidea.

AN interesting paper on the orientation of Greek temples has recently been communicated to the Royal Society by Mr. F. C. Penrose. As Professor Norman Lockeyer has lately shown, the Egyptian temples were built so as to allow the rays of certain rising or sitting stars to enter by the door and pass along the exis of the building. To allow for a change of amplitude in the star, the doorway, in some cases, has been altered and in other cases a new temple has been built by the side of the old one.

MR. Penrose finds that on the Acropolis at Athens two temples dedicated to Minerva are oriented in this way to the Pleiades, the earlier temple to an earlier position of the stars than the later one. At Rhamnus and Egina there are other temples oriented to the stars.

VERY severe strictures have from time to time been passed by eminent scientists, who have visited these islands, upon the unscientific arrangment and the neglected condition of the natural history collections in the Museum of the Malta University. Dr. Murray, Dr. Gregory, Prof. G. Henslow and Mr. G. Armitage have each in turn referred to the lamentable state in which the fossils, the zoological specimens, and the plants are kept, and have urged the desirability of the curator giving more care and attention to these valuable relics of Maltese natural history. Unfortunately, however, but little seems to have been done to carry out their suggestions, and at the present time the collections are in a condition such that reflects but little credit upon the professor in whose charge they have been placed.

For purposes of comparison the greater part of the collections have been rendered worthless owing to the promiscuous mixing of foreign specimens with local forms; while of the remainder a no small proportion are irrecognizable and therefore valueless on account of their neglected condition and the ill-usage to which many of them have been subjected.

It is much to be regretted that these collections, upon which such able scientists as Zerafa, Delicata, De Gregorio, and Gulia spent so much time and labour, and which comprise specimens such as any institution in Europe might be proud to possess, should be so little appreciated and so little cared for.

The current issue of *Natural Science* contains several pointed remarks on this subject, which were suggested by a recent visit paid to Malta by an official of the British Museum.

After alluding to the neglected state of the collections the editor very significantly remarks "*Fortunately*, nearly all the known Maltese fossils of importance are preserved in the British Museum."

THE curious fact that a very weak flavour in food or drink may intensify an altogether different predominating taste has been investigated by Prof. Zuntz, whose results have been given to the Berlin Physiological Society. Both salt and quinine were added in turn to sugared water, in proportions too small to impart a saline or a bitter taste, and in each case the water was made decidedly sweeter. The explanation is that the sensibility to taste is increased by the slight stimulation of additional nerves.

WHAT is probably the oldest prescription in existence was translated, with other medical papyri, in the course of a recent lecture by Prof. A. Macalisher, F.R.S. It was for a wash for promoting the growth of the hair of the mother of King Chata, second king of the first dynasty, who reigned about 4000 B.C. This is the translation: "Pad of a dog's foot, 1; fruit of date palm, 1; ass' hoof, 1. Boil together in oil in sauce-pan. Directions for use. Rub thoroughly in."

A sulphuric acid thermometer has been patented in Germany. The mercury in the ordinary thermometer, as is well known, freezes at about 40° below zero, rendering

the instrument useless at low temperature: and the alcohol thermometer is unreliable on account of the frequent evaporation of a portion of the fluid, which collects at the upper end of the tube. Sulphuric acid gives off no vapor at atmospheric temperatures, expands in the tube with perfect uniformity, and freezes only when the temperature falls to 112° below zero.

PHOTOGRAPHS of the sky, including all stars down to the fourteenth magnitude, are now being made at 18 places—Paris, Bordeaux, Toulouse, Algiers, Greenwich Rome, Catania, Helsingfors, Potsdam, Oxford, San Fernando, Tacubaya, Santiago, La Plata, Rio Janeiro, the Cape, Sydney, and Melbourne.

VARYING evaporation and influx of composition and density in different parts cause the sea to vary greatly in composition and density in different parts. A late Russian map shows that the center of maximum salinity in the Pacific lies between 20° and 30° north latitude and at about 170° west longitude. A tongue of considerably fresher surface water stretches nearly across the ocean in about 10° north latitude, and sweeps round the coast of America and Asia, including the Behring Sea but not the Sea of Okhotsk.

AN extraordinary snowballing was experienced at Glashutte, Saxony, on December 4 last. Dr. Puul Schreiber states that the balls of snow, which were light and measured from four to five inches, fell during a sudden calm in the midst of what seemed to be a thunderstom. The balls, five to twelve to a square yard, lay on the ground until the next day.

THE Simplon tunnel from Brieg in Switzerland to Ifella in Italy, will be 12½ miles long.

SOME years ago a Belgian chemist compressed metallic powder until the particles coalesced and formed a solid ingot, thus giving an effect ordinarily due to heat. An English chemist, Mr. H.N. Warren, believes that he has now produced the chemical combination of hydrogen and oxygen gases—which usually unite only on the application of heat—by simple pressure exerted at ordinary temperatures. In a small glass tube, into which were fused two platinum wires, was hermetically sealed a cubic centimeter of acidulated water. An electric current of six volts was applied, and the water was rapidly decomposed into hydrogen and oxygen until the end of 25 minutes, when the pressure of the gasses is supposed to have reached about 5700 pounds to the square inch, there was a vivid flash succeeded by a violent report, the glass being shattered and its fragments scattered with great force. The explosion gave sufficient evidence of the union of the gases, and immersion of the tube in cold water had made heating improbable.

THE two most widely accepted explanations of the maintenance of solar heat are (1) that it is due to the energy developed by meteoric matter falling on the sun, and (2) that it is produced and kept up by slow contractions of the sun's bulk. Considering these hypotheses, Dr. Joseph Morrison, of the American Nautical Almanac office, has

calculated that a pound of matter falling from infinity would develop 82,340,000 units of heat, and, therefore, that an annual meteoric fall equalling $\frac{1}{100}$ of the earth's mass would maintain the heat observed. The linear contraction of the sun's radius necessary to keep up the present radiation (allowing this to be 25 calorics per square metre per minute) is 156, 9 feet in a year, or nearly 30 miles in 1000 years. At this rate, it would require 7575 years for the sun to shrink one second of arc, this being the smallest angle measurable on the solar disc.

A novel electroscope due to Mr. E. C. Rimington, an English electrician, is especially interesting on account of its generation of light by a very small mechanical effort. A. T. shaped tube about five inches long, with about the bore of a spirit thermometer, and terminating in two bulls, has its air exhausted by an air-pump, and is them rotated between the finger and thumb, or by a small motor. On bringing a rubbed ebonite or glass rod near, a set of double fan-shaped images of light appears in the tube.

IT is odd to think of wild camels roaming about in Europe. Yet a recent traveler in Spain has proved their existence, the animals being evidently descendants of some which were introduced from the Canaries in 1833, and for some years used as beasts of burden in the province of Cadiz.

AN English chemist points out that the air held by sea-water increases in proportion with the depth, and that it is quite possible that the ocean may hide an atmosphere nearly equal to that above its surface.

WRITING on the subject of baldness, Dr. W. Joseph Syson remarks that it is much more common in men than in women, and he considers the causes to be insufficient exposure of the hair, influence of heredity excessive mental work and great anxiety, venereal and alcoholic excesses, constant washing, and want of pomade. Just how much is due to each cause cannot readily be estimated, The treatment recommended is the use of a light head-covering, to be worm as little as possible; washing only about once a week, with avoidance of much brushing; and the occasional application of some form of simple grease or oil.

THE City of Mexico occupies a peculiar position, being at an elevation of 7500 feet above sea-level and yet at the bottom of a deep valley with no natural outlet for drainage. The valley contains six lakes, which have an average total area of 200 square miles. The height of the water varies greatly, but is usually greater than that of most of the ground in the city, whose sewage can be disposed of only by pumping into the lakes. As a relief from inundations, a cutting 13 miles long through the hills was made by the Spaniards, who finished it in 1789 after nearly two centuries of work. This proved insufficient, but nothing further seems to have been attempted until about 25 years ago, when the Mexican government caused some French engineers to commence a tunnel to lead the water through intervening high ground to the cutting. These engineers deepened the cutting, completed about a mile of the tunnel at the outlet end, and commenced 25 shafts. In 1888 the contract for finishing the undertaking was let to two British

firms. The rapid inflow of water has interfered with the work, but the 25 shafts (ranging in depth from about 100 to 300 feet) have now been completed along tne line of the tunnel, and the tunnel itself (about 6 ¼ miles long and 14 feet in diameter) will be finished next year. A canal about 30 miles long, and 65 feet deep at its lower end, is being opened by one of the firms of contractors, and will connect Lake Texcoco with the tunnel. An area of about 350 square miles will be drained by canal and tunnel.

A curious experiment, having as yet no satisfactory explanation, has been performed by M. Hurmuzescu before the French Physical Society. A metallic wire was stretched horizontally in a glass tube containing gas either at ordinary pressure or rarefied. When the wire was heated to redness by a continuous current, it began to vibrate in a vertical plane, and the tube became much hotter at the bottom than at the sides.

HORSE meat is quite extensively eaten in several European countries. Its use in Paris began July, 1866, and in 1869 the consumption was 2758 horses, 65,000 during the siege, 5732 in 1872, and 10,619 in 1877. The horse butcheries numbered 48 on Jan. 1, 1874, and 132 on Jan. 1, 1889. The present price of the meat is about half that of beef. Horse butcheries are rapidly increasing in other French cities, and their output is becoming enormous, and even seriously affecting the trade in other meats. Horse meat is in great favour in Rotterdam, as well as in Germany, Denmark, Sweden, and parts of Italy, although rejected in Turin. Regrets have been expressed that it has not been adopted in Spain, where it would greatly benefit many poor labourers.

THE brain-weights of different races, according to the latest tables, are as follows, in ounces; Scotch, 50, 0; German, 49, 6; English, 49, 5; French, 47, 9; Zulu, 47, 5; Chinese, 47, 2; Pawnee, 47, 1; Italian, 46, 9; Hindoo, 45, 1; Gypsy, 44, 8; Bushman, 44, 6; Esquimau, 43, 9. The brain of the highest apes weighs only 16 ounces. The brains of the worst criminals of Paris average 55 to 60 ounces.

THE inner dark zone of a luminous flame has always been looked upon as a space where practically nothing is taking place, but Prof. V. R. Lewes has proved, as stated in a recent Royal Institution lecture, that in this portion of the flame the hydrocarbons are converted into acetylene, a gas which readily decomposes with heat into carbon and hydrogen. The decomposition takes place in the luminous portion of the flame, and it is the liberated carbon which, being heated to incandescence, gives the light. The outer non-luminous part of the flame, instead of being an area of complete combustion, is so cooled by the in-rush of air that it is extinguished before combustion is completed, the products of the incomplete combustion escaping into the air.

Editor J. H. Cooke, B. Sc., F.G.S., Malta.

Metereological Report.

Lat. 35° 55′ N. Long. 14° 29′ E.

Barometer Readings reduced to 32° F. at sea level.

ST. IGNATIUS' COLLEGE
MALTA.
1893.

Results of observations taken during the month of	March		Average 10 years	April	Average 10 years
Mean Reading of Barometer	inches	30·073	29·989	30·048	29·925
Highest „ „ on the 13th	„	30·385	30·363	30·386	30·256
Lowest „ „ on the 31st	„	29·771	29·496	29·705	29·499
Range of Barometer Readings		0·614	0·867	0·681	0·757
Highest Reading of Max: Therm: on the 18th ...		66·2°	74·7°	77·7°	77·1°
Lowest Reading of Min: Therm: on the 22nd ...		44·2°	42·9°	47·2°	48·0°
Range of Thermometer Readings		22·0°	31·8°	30·5°	29·1°
Greatest Range in 24 hours on the 22nd		19·8°	23·1°	22·1°	22·1°
Mean of all the highest Readings		61·9°	63·3°	66·9°	67·4°
Mean of all the lowest Readings		49·4°	50·8°	53·1°	54·3°
Mean Daily Range		12·5°	12·5°	13·8°	13·1°
Mean Temperature (deduced from Max: and Min.)		55·0°	56·2°	59·0°	59·9°
Mean Temperature (deduced from Dry Bulb.) ...		53·8°	55·6°	58·6°	59·6°
Adopted Mean Temperature		54·4°	55·9°	58·8°	59·8°
Mean Temperature of Evaporation		50·5°	51·9°	55·5°	55·6°
Mean Temperature of Dew point		47·5°	48·7°	52·7°	52·1°
Mean Elastic force of Vapour	inches	0·329	0·345	0·399	0·389
Mean Weight of Vapour in a cubic foot of air ...	grains	3·7	3·9	4·4	4·4
Mean additional weight required for saturation...	„	0·9	1·1	1·1	1·4
Mean degree of Humidity		79	79	81	77
Mean Weight of a cubic foot of air	grains	540·4	537·0	534·4	531·0
Fall of Rain	inches	2·268	0·896	0·247	0·768
Number of days on which Rain fell		7	7	3	6
Mean amount of Cloud (an overcast sky = 10) ...		4·5	4·4	4·3	4·3
Total number of miles of Wind indicated ...		7271	8175	6585	8473
Mean Velocity of Wind per hour...	miles	9·8	10·9	6·6	11·8

REMARKS.

March.

Dew Point: ranged between 56·6° on the 17th and 34·8° on the 27th.
In Sunshine: the highest reading was 129·2° on the 25th.
On Ground: the lowest reading was 38·0° on the 22nd.
Thunderstorms passed on the 2nd.
Lightning was seen on the 7th and 25th.
Total Rainfall since last June 25·669 inches; the average of 10 years, 17·778 inches.

April.

Dew Point: ranged between 38·7° on the 12th and 60·3° on the 23rd.
In Sunshine: the highest reading was 134·1° on the 28th.
On Ground: the lowest reading was 41·9° on the 18th.
Lightning was seen on the 9th.
Total Rainfall since last June 25·669 inches; the average of 10 years, 18·546 inches.

(Signed) James Scoles, S. J.

BRITISH MUSEUM NATURAL HISTORY

CHESS.

"Labor et constantia"

All communications connected with this column to be addressed to the editor of the Chess Column, 48, Strada Mercanti.

Correct Solutions of Blumenthal's Enigma received from F. Z., Nemo, St. Julians, and J.S.

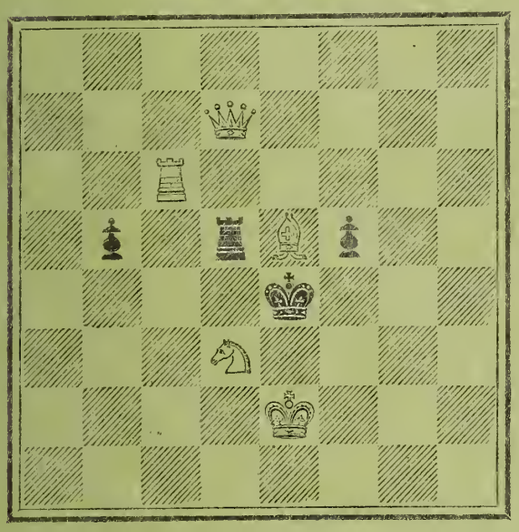
SOLUTION.

	White.	Black.
1.	Q to Kt 8	Any
2.	Mate accordingly.	

PROBLEM No. 1

BY LEO. BENJACAR, Malta.

BLACK.



WHITE.

White to play and mate in two moves.

OFF HAND PLAY

(Vienna opening.)

WHITE.	BLACK.
1 P to K 4	P to K 4
2 Kt to Q B 3	B to B 4
3 P to K B 4	P to Q 3
4 Kt to B 3	Kt to K B 3
5 B to B 4	Kt to B 3
6 P to Q 3	P to Q R 3
7 Kt to Q 5	B to K 3
8 P to B 3	B to R 2
9 B to Kt 3	Castles
10 P to B 5	B tks Kt
11 P tks B	Kt to K 2
12 Kt to R 4	Kt (K2) tks P
13 Q to B 3	P to K 5
14 P tks P	R to K sq
15 B to B 2	Kt tks K P and wins (a)

(a) A pretty finish. If B tks Kt. Q tks Kt ch and wins a piece.

Brilliant game played in the match Lasker v. Showalter (Queen's Pawn Opening):—

WHITE—Lasker.	BLACK—Showalter.
1 P—Q 4 (a)	P—Q 4
2 Kt—K B 3	Kt—K B 3
3 P—K 3	P—K 3
4 B—Q 3	P—Q Kt 3 (b)
5 Q Kt—Q 2	B—Kt 2
6 Kt—K 5 (c)	B—Q 3
7 P—K B 4	Castles
8 Q—K B 3	P—Q B 4
9 P—Q B 3	Q—B 2
10 P—K Kt 4	Kt—K sq
11 Q—R 3	P—Kt 3
12 P—Kt 5	B × Kt
13 B P × B	Kt—Kt 2
14 K R—Kt sq	Q Kt—Q 2
15 Kt—B 3	K R—Q B sq
16 B—Q 2	P—Q R 3
17 Q—B sq	P—Q Kt 4
18 P—K R 4	P—B 5
19 B—B 2	R—K B sq
20 Q—R 3	P—Q R 4
21 Kt—R 2	P—Kt 5
22 Kt—Kt 4	P—Kt 6
23 B—Q sq	Kt—K B 4
24 P—K R 5	K—Kt 2
25 Kt—B 6	R—K R sq
26 B—Kt 4	Kt—K 2
27 B × P	Kt × P
28 P × Kt	P × B
29 Q × P	R—R 3
30 P—R 6 ch	K—B sq
31 Q—Q 7	Q × Q
32 Kt × Q ch	K—K sq
33 Kt—B 5	R—R 2
34 P × P	P × P
35 R—K B sq	B—B 3
36 Kt × P	P—R 5
37 Kt—Q 4	R—K B sq
38 R—B 6	B—Q 2
39 P—K 6	B—B sq
40 Kt—Kt 5 (d)	Resigns

(a) A close form of opening, much in favour in match play, leading frequently to skilful manœuvres for position and small advantages.

(b) Preliminary to developing his Q B, which must now be played to Kt 2, where, bearing upon the centre and the opponent's castled position (White usually castling K R), he remains generally for a long period not very active, but a factor to be reckoned with.

(c) Herr Lasker by this and other moves departs altogether from the usual cautious tactics, and the game at once assumes an original and interesting character.

(d) One point of the ending is that Black cannot exchange without leaving one or more pieces en prise. The play of White is accurate, bold, and vigorous, and we have seen few more interesting games.

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208

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Assisted by A. CARUANA GATTO, B.A., LL.D.,

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The Mediterranean Naturalist.

Contents-June.

		PAGE
1	La Botanique du Nord-Etbai—E. A. Floyer	363
2	"Falco punicus" in Malta—N. Tagliaferro	366
3	Animal plagues	367
4	The Malta Potato Disease	367
5	The Effect of Pressure in causing a thinning of soft strata—G. J. Burns, B.Sc.	368
6	The Worlds Coal Supply	369
7	On the Slugs of the Maltese Islands—A. Caruana Gatto, B.A., LL.D.	370
8	The Street of Duels	373
9	Diamond making	374
10	The Marls & Clays of the Maltese Islands—John H. Cooke, F.G.S.	374
11	City Dust	378
12	Geological Notes on Acireale—G. Platania	379
13	The Pola Deep Sea Exploration	380
14	On the occurrence of lignite in the *Globigerina* bed of Malta—N. Tagliaferro	380
15	*Science Gossip*:—Do glaciers excavate?—The Peronospera in the Mediterranean—Irrigation—Flies and Cholera—Causes of modern debacles—Maltese Aphididæ and their foes—Origin of stars—Vandalism in Malta—Earthquakes in Malta—Leprosy and fish-diet—A new Botany—Electric farms—Prehistoric music—Survey of Greece—Curious roofs—The forms of eggs—The navigation of the air—A radio-micrometer—The moth as a chemist	381
16	Maltese Meteorology	386

Contents-August.

		PAGE
1	Wanted—A museum for Malta	387
2	Artificially coloured flowers	389
3	Petroleum Theories	389
4	Resoconto di una escursione fatta alle grotte di Isoverde in Liguria da Emilio Balbi ed A. Caruana Gatt	389
5	On Fuligula rufina in Malta—N. Tagliaferro	391
6	City Dust	392
7	La Botanique du Nord Etbai—E. A. Floyer	392
8	The Orange Disease in Cape Colony—S. D. Bairstow, F.L.S.	394
9	Colours of Ancient Egypt	399
10	A Modern Golgotha—Minnie Cooke	400
11	The Collection and preparation of foraminifera—E. Halkyard, F.R.M.S.	401
12	Deep Sea Exploration in the Eastern Mediterranean	402
13	On the Occurrence of Concretionary masses of Flint & Chert in the Maltese Limestones. J. H. Cooke	403
14	*Notes and News.*	405
15	Maltese Meteorology	440

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CONTENTS.

		Page
1	The Utilization of the Waste Lands of Malta—John H. Cooke	411
2	Plant Extremes	414
3	Egyptian Horses	415
4	Notes sur la gèologie de l'Etbai nord ou désert Est ègyptien—E. O. Floyer	415
5	The Mystery of the Moon	417
6	Local Notes—A. C.G.	418
7	Starlings—A. Walker	419
8	On the Occurrence of Echeneis Nauerates in Maltese Waters—Prof. N. Tagliaferro	421
9	A Novel Industry	421
10	Sui Limacidi dell'Algeria—Prof.. C. Pollonera	422
11	Method of taking plaster casts of Natural History Objects	425
12	The Orange Disease in Cape Colony—S. D. Bairstow F. L.S.	425
13	Hints for Young Collectors	428
14	*Notes and News*:—Capture of a Sea-Cow—Orange disease in China—Discovery of Phœnician remains in Malta—Maltese agricultural methods—Disease of the olive tree. Egypt's date palms—Reptilian fauna of Malta—Tapeworm statistics—Malta bees and their work—Locust-egg oil—An antiquarian's opinions—etc. etc. etc.	429
15	Maltese Meteorology	434

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To Correspondents.

In consequence of our absence from Malta, the publication of this, the October number, has been considerably delayed.

The Utilization of the Waste Lands of Malta.

A New Industry for the Maltese—A Suggestion.

The progress of industrialism in Malta has, of late years, been steadily on the decline, and at the present time considerable difficulty is being experienced in finding the wherewithal to employ the teeming and ever increasing population of the islands.

Among every section of the agricultural, the commercial, and the industrial portions of the community the effects of over population are making themselves markedly apparent; and evidences are not wanting to show that unless steps be taken to introduce some radical changes in the present industrial *status quo*, either by enlarging the field of labour, or by fostering a spirit of progress and enterprise among the people, the day is not far distant when the Maltese labourer will have no alternative between emigration to other lands, and the endurance of a life-long state of chronic indigence amongst the limited and impoverished resources of his native islands. I am well aware that this subject is a well worn one. It has long exercised the minds of the legislators of the islands, and from time to time attempts have been made to wrestle with it: but, either from misguided efforts, or from want of energy and persistence of purpose, most of the schemes that have been inaugurated have resulted in partial or in total failure.

Haphazard speculations have been attempted and like all undertakings that have not been conducted on sound scientific principles they have all ended in discouragement and disaster.

Several suggestions have lately been made in the local papers of a more or less Utopian character: but it is not by talking about the undertaking of fruitless researches after artesian systems, coal, petroleum and other minerals, which science

tells us do not, and cannot, exist in the islands' strata, that the prosperity of the people is to be secured. The islands possess much natural wealth, and abundant resources; but they do not lie in this direction.

It is for the purpose of indicating what some of these resources are, and pointing out how they may best be utilized so that they may be productive of the greatest amount of good to the greatest number that this paper has been written.

But the subject is a broad one, and of too important a character to allow of exhaustive treatment in the limited space at my disposal.

I shall therefore confine my attention to but one phase of it; and I feel assured that if this phase receives proper and adequate attention that the results that will accrue will go a long way towards alleviating a no inconsiderable amount of the poverty which at present exists among the Maltese labouring classes, and as it will inevitably lead to the establishment of a new and a lucrative industry it will be the means of providing sustenance for a large number of those who are now, or who are about to be, thrown on the islands' already over-stocked labour market.

According to the returns which were published in the last Census report (1892) the total areage of the Maltese Islands is 270,399½ tummoli, (75,111 acres). Of these 157,316 tummoli are utilized by the islanders for the raising of cereals, and leguminous and other crops; while 113,083½ tummoli, or about 42 per cent of the islands' total areage may be roughly considered as being *uncultivated* or *uncultivable.*

In view of the general depression of trade throughout the islands, and of the constant complaints of the labouring classes owing to the overcrowded state of the labour market, — that nearly one half of the total areage of the group should be absolutely waste ground seemed *prima facie* so extraordinary a statement as to merit some examination of the facts upon which it was based.

With the courteous assistance of Professor N. Tagliaferro this examination was made and the result has shown that, as far as the Census returns are concerned, the figures are perfectly correct.

The qualifying phrases which have been added are, however, less unequivocal and reliable.

Uncultivated the area certainly is: *uncultivable* it most assuredly is not.

To be able to properly appreciate this question, some knowledge of the surface geology of the islands is essential. A few general remarks on the subject may not, therefore, be deemed out of place at this juncture.

The waste lands in Malta and Gozo are invariably found to predominate in those areas where the Lower Coralline Limestone, and the Upper Coralline Limestone crop out at the surface.

The Lower Coralline Limestone districts are few in number and limited in extent, the principal being the tracts around Casals Asciak and Chircop; along the shores of Marsa Scala, Ricasoli, St. Julians, the Dragonara, Pembroke and the Salines; and in the interior of the islands, in the vicinity of St. Salvatore, Zebbug, and Musta.

Being situated near populous centres many of these have been partially cultivated; but as a rule the crops are thin and dwarfed, and barely pay for the labour. Allusion has already been made to these facts in various articles which have appeared in the columns of this journal, and it has been pointed out how these soils might be profitably improved at a minimum of cost. There is, therefore, no need to enter into a further discussion of this part of the question now: so I will pass on to the consideration of the other uncultivated tracts.

Nine-tenths of the uncultivated grounds of Malta are to be found in the Upper Coralline Limestone districts.

The Upper Coralline Limestone is a rock of a very variable nature. In some parts it readily disintegrates, and forms a rich red soil: while other portions are so exces-sively compact, as to effectually resist all ordinary denudational agencies.

Everywhere this formation is covered with a hard crust which, by protecting the rock beneath it, prevents the formation of soil by natural agencies, and the area in which it crops out is therefore characterized by a rugged, barren, sterility.

The Upper Coralline Limestone is found in the Southern and Western parts of the island, capping the plateaux; and it usually so situated, owing to dips and faults that for a considerable portion of the year the conditions are such as to

render it unsuitable for the growth of any but the most hardy of plants.

The winds of winter, the sparsity of soil, and the droughts of summer are inimicable to the production of crops in paying quantities: and the consequence is that the greater part of this district is neglected, and is little more than a barren waste.

But there is no reason why such a state of things should continue to endure. The constituents of which the rocks in the neighbourhood are composed are such as are suitable for making the richest of soils—besides which, there is a plentiful supply of phosphates, sulphates and other plant food in the underlying beds.

In those localities where the soil is too scant to allow of its being spread over the rocky area, the rock might be crushed and an unlimited supply of soil might thus be obtained.

Some parts of the plateaux area are, too, covered with extensive deposits of red loams, and slightly indurated breccias which lie hidden beneath a thin covering or crust of compact limestone. This crust, like that which covers the surface of the Upper Coralline Limestone, owes its origin to a species of metamorphism which has been induced by capillary action set up by the heat of the sun; and so closely does it resemble the superficial layers of the rocks around that the true character of these rich loams are often effectually concealed.

Here and there, as in Uied el Mista and Tal Puales, the husband man has made the discovery for himself, and has broken up portions of the beds and made fields of the rich, fertile soil: but in the majority of cases these beds lie unutilized and unrecognized.

They do not, of course, extend uniformly throughout the area: but where they do occur they often average 10 and 15 feet in thickness so that there is always soil enough when spread out, to extend over an area three and four times greater than that which they originally occupied.

If these beds were used, in conjunction with the soil obtained from the crushing of the rocks, considerable areas of land might be brought into cultivation and new sources might thus be opened up.

The total area of the reclaimable land may be roughly estimated as being equivalent to about one fifth of the total extent of the islands. This would represent an areage of cultivable ground equal to about 54,000 tummoli, and this reckoned at 10/- per tummoli per annum, which is the average price of land in Malta (census report 1892), would mean an addition of about £ 27,000 per annum to the wealth of the islands.

But who will undertake the expenditure that would be necessary to inaugurate a scheme of this description?

As is well known, the Maltese farmer, is no capitalist, and therefore the small outlay that it would be necessary for him to incur for breaking up these deposits, for laying them on the surrounding rock areas, and for suitably draining and irrigating them would be an insuperable barrier to his undertaking the work.

It is the financier, and the financier only, that can effectively carry out the work so as to make the reclaimed land produce an adequate return for the time, labour, and capital which it would be necessary to spend upon it.

I have already drawn attention to the fact that the exposed situations of the unreclaimed lands militates considerably against their value to the agriculturist.

But why would not these lands be planted with crops suitable to the peculiar climatic and geognostic characters of the district?

Why do not the Maltese capitalists combine with the Maltese agriculturists for the purpose of introducing into these islands the industry of Sisal growing which is at the present time doing so much towards increasing the wealth of the people of the Bahamas?

The plant, *Agava rigida*, is a species of wild aloe, the fibres of the leaves of which are at the present time in great demand for rope making in the London market.

Like our own ubiquitous prickly pear it will grow in any limestone soil, and it is proof against winds, droughts, and most of the other evils to which the majority of plants usually succumb.

A few years ago, at the time of the great depression in the sugar trade, the Governor of the Bahamas, Sir Ambrose Shea, induced the Bahamese to take up the systematic cultivation of the plant; and some idea of the success that has attended their efforts may be gleaned from the

fact that thousands of acres of the sugar plantations, and thousands of acres of what had formerly been *waste ground*, of a character similar to the plateaux region of Malta, are now laid out for sisal growing. The total cost of production, and of placing the material on the London market is £ 12 per ton: the market price at present is £ 26 per ton, so that there is a net profit of £ 14 per ton.

The sisal will grow anywhere, no matter how how poor the soil may be: *but* the climate and soil of Malta are specially suited for it.

Beyond planting and occasionally trimming, it requires no further attention; and at the end of the third year the harvest begins and continues, without intermission, for from seven to ten years.

No preparation other than that of the most simple kind is necessary.

When the long, sharp-pointed leaves are ripe they are picked and crushed; after which they dried in the sun, washed in salt water, and then shipped to England.

The demand for sisal fibre at the present time is so great that £ 2 per ton more is offered for it than is offered for Manilla Hemp.

The Maltese might follow the example that has been set!

The climates of the two groups of islands are very similar; and the soils are almost identical in composition. And in addition to this the Maltese Islands have these Quarternary loams and breccias, to which I have just alluded, and which contain such stores of fertile, alluvial soil.

Nor is this all. *The Sisal plant has for some years past been grown in Malta for ornamental purposes;* and it has *flourished* and *multiplied.* But no one seems to have guessed its true nature, or to have known anything of its great economic value.

The project here proposed may, therefore, be considered as being now beyond the experimental stage: and it awaits only the necessary capital, energy, and enterprise to carry it out and make it pay.

If these 54,000 tummoli were reclaimed as is here suggested their land value, at the average price, would represent a value of £27,000 per annum. If planted with Sisal, taking the produce per acre in the Bahamas as our basis of calculation, these 54,000 tummoli would yield at 7½ cwt. of fibre per tummolo, about 7,500 tons per annum and this at the market price £ 26 per ton is equivalent to about £ 200,000 annually. In other words each tummolo of ground would yield an annual income of £ 3. 15. 0.

In the fore-going necessarily brief remarks I have endeavoured to point out the more salient features of what would, I have no doubt, be a successful and a profitable industry for these islands: and which would, by the utilization of the thousands of acres that are at the present time lying idle, help to provide for a large proportion of of the islands surplus population.

It is but a bare outline, and it is obviously open to many developments; but it is practicable and would go far towards meeting the necessities of the case.

JOHN H. COOKE.

Plant Extremes.

A recent writer, Mr. G. C. Neally, remarks that the resources of Nature in the vegetable kingdon are strikingly displayed in the division Phanerogamia (flowering plants), where we see a marvellous variety in range, abundance, and characteristics, but that it is in the Cryptogamia division (flowerless plants) that the greater extremes are found. Considering temperature, we find that many of the Arctic lichens vegetate below freezing point. In the Algae class, the so-called red snow of Arctic regions grows in a like cold; and there are not only others that live in hot springs, but in the Island of Amsterdam a species of liverwort exists in mud said to be much hotter than boiling water. There are plants for every possible degree of light. Many of the mosses and lichens flourish on rocks and old timber fully exposed to the sun's rays, and on the other hand, species of fungi have homes even in the darkest caverns and mines. Moisture seems essential to vegetable growth. Many plants are known which are always beneath the water's surface, while some of the lichens are at home on desert rocks, though it is probable that some moisture must be received at some time by every plant. Great diversity in age is one of the striking characteristics of plants. Pouchet says that some of our common moulds pass in a single

day through all the phases of life, but by a singular contradistinction some plants of the same class grow with inexplicable slowness, and Vaucher watched a yellow lichen on a housetop for forty years without noticing a perceptible increase, leading De Candolle to declare that the lichens which cover our rocks possibly go back to the times of the cataclysms that laid the rock bare. The form and size of plants show vast contrasts. Beginning with organisms visible only through a powerful microscope, we pass many gradations, finally reaching sea-weeds 1000, and in one species more than 1500, feet in length. Other extremes are found in the germination and reproduction of plants. The Algae class furnishes species of but a single cell, but in a large mushroom, weighing 4 ½ pounds, the cells were found to number 106,596,000,000,000. Some plants die immediately on being removed from their peculiar habitat, while others retain their vitality after half a century in a herbarium.

Egyptian Horses.

Referring to the present condition of the breed of Egyptian horses, Mr. Alban, our Vice-Consul at Alexandria, in his last report, says that an attempt has recently been made to improve it, and for this purpose a Government Commission was appointed last year. Pure breed Arab stallions have been purchased and stationed in various districts. Horse shows have been held in these districts, and a large number of certificates have been delivered to the owners of such mares as were considered by the commissioners to be sufficiently sound and promising, entitling them to the use of the Government stallion stationed in their district. Almost all horses in Egpyt are of Syrian origin, and Egypt is dependent for her supplies on Syria. The exportation of horses from Syria is frequently prohibited for varying periods by the Turkish authorities, which results in an inconvenient scarcity and dearness. Mr. Alban hopes that continued efforts will be made to encourage horse-breeding in Egypt.

Notes sur la geologie de l'Etbai nord ou desert Est egyptien.

PAR

Ernest Oyscoghe Floyer.

"Nos qui seqimur probabilia nec ultra quam id quod veri simile occurrit progredi possumus, et refellere sine pertinendiâ, et refelli sine iracundiâ parati tumus)

Cic. II, Miscel. 2

L'intérieur de l'Etbai nord n'ayant pas encore été visité, fut pendant quelques années, pour les géologues anglais, ce que la planète Mars a été pour les astronomes. D'après des traductions plus ou moins fidèles de Russegger, sur le Nil, de Schweinfurth, sur la côte de la mer Rouge, et de Fraas, sur la route de Kena-Kosair, on a fait la carte du pays en la couvrant de mers éocènes et d'océans crétacés; l'âge du grès, qui forme une grande partie de sa surface, a été discuté avec une chaleur qui remplace mal l'examen de ce grès sur les lieux

Nous avons voulu préparer la voie aux géologues futurs en indiquant approximativement les limites des principales formations que nous avons effectivement rencontrées, les endroits où tout n'est que grès, et ceux où l'on peut observer des complications intéressantes. Les sections idéales que nous présentons répondent aux indications de la surface. Les altitudes et les angles des strates sont corrects, mais la direction souterraine de ces strates est en tout cas purement hypothétique.

Les roches de ce désert présentent une caractéristique curieuse: l'absence de terre et de verdure ferait supposer que cette solitude est un paradis pour les géologues. Mais c'est un fait curieux, remarqué tout d'abord par M. Brindley, que toutes ces roches étalent une couleur brune uniforme. Ainsi, pour identifier une roche, il est presque toujours nécessaire de descendre de sa monture et de casser un fragment de pierre. Nous avons de cette façon, recueilli plus de mille spécimens choisis sur 68 points environ.

Les cartes et les sections annexées à ce chapitre donnent une idée générale de la configuration du pays. Elles sont accompagnées de quelques explications et de quelques faits dont la vérification et le développement pourront constituer une tâche intéressante pour les visiteurs à venir.

On trouve d'abord une longue chaîne de roche ignée, allant du nord nord-ouest au sud sud-est. Dans cette chaîne, le porphyre forme parfois des pics élevés. Il en est ainsi à Jebel-Dukhan, où sont situées les carrières de porphyre rouge, maintenant exploitées par M. Brindley. Viennent ensuite, dans la direction sud, les pics de porphyre de Hullus, et, au sud encore, les pics, de porphyre apparemment,—nous ne les vîmes qu' à distance,—de Jebel-Ferayeg. De Ptolémée. Entre ces pics, la rangée s'abaisse; le granit ne fait qu'apparaître; parfois ce n'estque de l'argile et du grès. La rangée côtoie la mer, et à l'est, les vallées sont courtes, fréquentes et profondément érodées, tant à cause des pluies, que rend plus nombreuses le voisinage de la mer, que par suite de ce que les pentes du flanc *est* sont plus raides que celles du flanc ouest. A l'ouest de la ligne de partage des eaux se trouvent quatre principaux bassins d'écoulement: le Zeiduu, l'Abbad, le Khareit et l'Allaki. Ce dernier n'est pas indiqué sur la carte, attendu qu'il rejoint le Nil au sud d'Assouan.

Ces bassins occupent un vaste lit de grès qui s'incline légèrement à l'ouest et au nord, où il s'enfonce sous de la pierre calcaire. A la latitude de Kosair, des deux côtés de la ligne de partage des eaux, on trouve de la pierre calcaire superposée à du grès, lequel recouvre à son tour de l'argile bleue. Il nous est possible de conjecturer de l'épaisseur primitive de ce grès par différentes circostances qui nous permettent de l'évaluer à 1000 pieds mais il sinblerait que l'épaisseur actuelle n'est pas bien grande. Sous le grès vient une couche d'argile bleue, absente ou très mince au sud, et augmentant en épaisseur vers le nord. Cela semble avoir quelque rapport avec le micaslate du Jebel Zabbara et les bréches schisteuses de la route de Kena-Kosair. Sous l'argile bleue vient une roche granitique grise. C'est une roche à grain très gros, composée presque absolument de feldspath et de mica, et se désagrégeant trés vite à cause de la présence de ce dernier. Elle présente souvent des taches sombres, que les Arabes appellent taches de la lèpre, et qui proviennent d'une plus grande proportion de hornblende.

Cette roche constitue une grande partie de la surface, à l'est de la ligne méridionale de partage des eaux, où elle n'a été recouverte que par du grès en admettant que l'on puisse prouver que le grès l'ait jamais recouverte.

Percée en cavernes et en embrasures, et ressemblant parfois à de grands boulets de canon, elle s'écorche et s'écaille, comme une boule depâte. Tous ceux qui ont écrit sur ce pays depuis Strabon, ont remarqué ce fait, et il paraît tellement dû àl'action d'un torrent que Colston a écrit, en le constatant: "On dirait qu'il y a eu une cataracte en ce lieu."

Le lapis Psaronius extrait de Jebel Fatirah est probablement la même roche, devenue plús brillante et plus étincelante par la présence d'une plus grande portion de quartz et de hornblende. Il s'élève en grands sommets et en bosses appelées "Mudarghag", dont quelquesunes ont une hauteur relative de 1,600 pieds et se dressent sur la masse de leurs propres écailles. Elle sont grises, comme celles de Hamrat Mukbud, couleur de peau de buffle, comme Abu-Diab, roses comme Kodaboro, qui est presque entièrement composé dé feldspath rose, et sur les flancs duquel ruiselle, pareil à une neige rose, un gravier très brillant.

En quelques endroits, — et, à moins que les observations ne soient erronées, ces endroits se trouvent là où la roche de cataracte touche le grès, — ce cernier est transformé en une roche cristalline vert brillant. Cette pierre est superbe aux mines d'Um Eleagha; et l'on peut voir encore, au Wadi-Hullus, un bloc qui, grès à l'une de ses extrémités, se transforme en un granit jaune, puis, rencontrant une veine de hornblende vert, devient exactement le granit vert d'Um Eleagha.

Au-dessons de la roche de cataracte se trouve un granit dur et très compact, apparemment très épais. Ce granit ne paraît guère souvent à la surface, mais forme les principales masses de montagnes, telles que Abu Ergub, Aybarun(1), Hamata, Abu-Gurdi, et les pics jumeaux de Hamamid. C'est dans la proximité de la grande masse de Hamata que le porphyre de Hullus paraît avoir différentes couleurs, mais principalement une matrice chocolat foncé, avec de petits grains de quartz. Il y a d'autres couleurs; la plus remarquable est peut-être le vert de mer, qui, usé par l'atmosphère, revêt une surface tirant sur le pourpre, avec des éclats jaunes ressemblant quelque peu à la poitrine d'un étourneau.

(1) *Il faut noter, en passant, que le mot Aybarun est très commun en Abyssinie.*

Nous suivrons d'abord une section tirée dans la latitude d'Assouan. En quittant Assouan par Bab El-Ajjaj, on croise une masse de roches cristallines et schisteuses contenant du diorite, du dolérite et du syénite. Elle s'élève graduellement à une hauteur de 900 pieds, puis, an Wadi Allowi, qui s'écoule dans le Khareit, elle tombe à 700 pieds, niveau de la plaine de grès.

Une fois le flanc de la basse chaîne porphyroïde de Jebel Himira dépassé, le désert plat s'élève régulièrement et presque imperceptiblement à l'est. La surface est marquée de longues chaînes de grès, couchées horizontalement, dans le sens du nord-ouest au sud-est, et d'une hauteur relative de 200 à 600 pieds. En cet endroit, il existe du bois pétrifié semblable à celui qui se trouve en dehors du Caire.

La route suivie se dirige vers le sud de la section, en passant par les puits d'Abu-Hashim, qui sont situés à une hauteur de 1,100 pieds, dans une vallée qui s'échappe d'une roche de grès et de schiste. Mais la section Assouan-Bérénice remonte la large vallée de Khareit, jusqu'à un amas de rochers de "cataracte," qu'un Anglais reconnaîtra de suite sous le nom de Stonehenge.

A une hauteur de 1,500 pieds se trouve l'extrémité de la plaine de grès. La roche de cataracte augmente de volume et se bombe à travers le rebord du grès, qui va en s'amincissant rapidement.

Là se trouvent des signes de métamorphose qui permettent à peine de se tromper, et dont nous parlerons plus loin.

Le Mikbia' *est* la formation de "cataracte" qui s'élève en un angle toujours croissant jusqu'à une hauteur de 2,450 pieds; elle devient alors perpendiculaire. La pente est très raide des deux côtés, et l'on a une vue grandiose sur la plaine vaste et plate. Les montagnes d'Abrak et de Hajar El-Fil s'élèvent au-dessus de l'horizon, Kahfa se dresse comme une montagne d'avant-poste, tandis que la bosse curieuse et chauve de Sala'ia, forme, dans le voisinage, un point de reconnaissance vers le sud-ouest; à l'est, la vue s'étend par l'ouverture qui sépare les monts Mikbia' des monts Khashir, sur la mer et sur un îlot de corail; tout à fait au sud se dresse la chaîne granitique aiguë de Safint, cachant à la vue le cône massif granitique d'Abu Gurdi; au nord s'élèvent les pics de porphyre de Hullus.

Suivant le Wadi Mikbia' à l'est, la ligne traverse une grande variété de schistes verticaux, et, finalement, nne rampe plane de rochers de "cataracte" jusqu'à la mer. Sur le bord, on recontre des bancs récents et peu élevés de grès et de pierre calcaire, et, dans la mer elle-même, du corail, d'où s'élèvent des forêts de mangliers. Abu Gurdi forme un gigantesque cône tronqué de granit compact, qui tourne au nord tout l'écoulement qui jusque-là se dirigeait vers l'est.

Il est entouré de schistes verticaux et d'un mélange de roches schisteuses, couchées en fines strates et formant avec l'horizon des angles variés à l'infini. Mais, dans la direction de la mer, ces schistes font place à des roches de cataracte. Roche de cataracte, avec chaînes de schistes verticaux et, sur la mer un étroit filet de pierre calcaire et de grès récents, telle est la description générale des roches à l'est de la ligne de partage des eaux, sur une étendue de 60 milles au nord.

Le bassin d'écoulement du Wadi Jemal est la seconde chose à décrire.

A mesure que l'on s'approche de la mer, les pics élevés de porphyre de Hullus se dressent en pente rapide jusqu'à une hauteur de 2,000 pieds; puis, brusquement, ils s'élèvent de 1,000 autres pieds. S'il était possible au voyageur de grimper au sommet de ces pics, dont la hauteur est de 4,500 pieds, il tomberait dans un profond ravin courant vers le nord-est; c'est à la source de ce ravin que se trouvent les grands arbres ombreux et les troupeaux bien nourris des patriarches Abdallah et Koraim. De l'est à l'ouest, la chaîne n'est que de six milles, et l'escarpement de la falaise ouest, par la passe d'Helgeit, est à peine moins prononcé que celui de la falaise est.

(To be continued).

The Mystery of the Moon.

—Reviewing the theories of lunar craters, Mr. A. C. Ranyard. the editor of *Knowledge*, states that from the conspicuous white spot known as Tycho radiate a great number of whitish streaks that extend over more than a third of the visible hemisphere of the moon, indicating that this crater has been the centre of a clossal disturbance. The ring of Tycho is 54 miles in diameter. The great crater Clavius, to the south of Tycho, is 140

miles in diameter, and the broken ring of mountains round the Mare Imbrium may be the remains of a crater more than 500 miles in diameter. The largest terrestrial craters are not more than 15 or 16 miles in diameter. It has been doubted by many able men whether there is any true analogy between the terrestrial volcanoes and the gigantic lunar ring mountains and circular depressions that we speak of as craters. Robert Hooke compared the lunar craters to the cupshaped pits formed on the surface of mud by escaping vapor. S. E. Peel assumes that the lunar surface consists entirely of ice, in which craters and pit-like depressions have been made by the action of intermittent hot springs from the warm interior of the moon. The theory that the craters were formed by a rain of meteors has had many advocates even R.A. Proctor inclining to it. Mr. Ranyard favours the volcanic theory. It has been recently shown by G. F. Becker that the hot interior of the earth is very probably solid under the pressure upon it, becoming fluid as lava on release from pressure; and assuming the moon to be made of similar materials it would be necessary to reach a depth six times as great as on the earth before the pressure would solidify the molten rock. This would presumably give rise to lava flows a on gigantic scale.

Local Notes.

The prolonged Scirocco and the want of rain have made a most trying month of September. This time last year the country was already mantled in green and all the Autumn plants had flowered. Even that was an early season, it is true; but in comparison with this the Autumn of 1893 is an extraordinaryly late one. Thus while the soil still mantains its parched and dry summer appearance, the *Narcissus serotinus*, the *Muscari parviflorum*, the *Scilla autunalis*, and the *Colchicum Bertolonii* do not show any trace of their tiny flowers nor of their scanty leaves.

Vegetables are very scarce in the markets and those to be obtained are anything but well developed; the sulla, barley and vetch crops are still left to the hopeful countryman in the form of seed and he is looking forward eagerly to the expected benefit of rain because its need is now being much felt by everybody, so much so that, it is said, water is running short in the reservoirs on which the water supply of the Island depends.

It is certainly an unusual sight in Malta to see the summer habit of nature kept on until so late, and it is to be hoped that it will not be long before it will be changed for something more seasonable.

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The prevalence of South winds in September would make one think that the Autumn migration of birds must have been great. Every sportsman was in high hopes when so early as the first days of August some quails were seen, but these hopes were vain, because the Autumn passage of quails and other birds, notwithstanding the favourable winds prevailing, was very poor. And not only were the quails not abundant but turtle-doves, and blackjars were more scarce, and on the whole the sporting season was a failure.

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In a previous issue of the paper it was stated that the vines have this year escaped the attacks of "peronospora", which had caused so much damage last season. This statement can be now not only fully confirmed but it must be added that the vines have yielded a most abundant crop.

This happy result may have some connexion with the measures enforced by the Peronospera Commission or it may not, because even in vineyards where no precautions against mildew were taken, no peronospera has appeared this year.

It would be, no doubt, most desirable and of general interest to get some official information concerning the work done by the Commission and the result obtained.

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From the good news about the vine disease we pass to the less satisfactory news concerning the orange disease. Nectarines and peaches have this summer been also very productive but they have been unsparingly attacked by the "Ceratitis citriperda".

A fresh recrudescence of the orange disease can be therefore reasonably expected.

Prof. Tagliaferro who has called my attention to this fact informs me that he has already noticed quantities of this fly in his garden at Musta.

Orange growers had, therefore, better be on their guard against the enemy while there is yet time.

***

Another tree that has suffered very severely from disease this summer is the "*Hitolacca dioica*", which though of no economic or industrial value is one of the few trees used here for ornamental purposes, occuping together with the "*Ailantus*" and the "*Melia*" amongst us the place which the *Robiniae*, *Magnoliae*, *Eucalyptus* etc. take in other places.

Its hardiness had protected it from all disease, until this summer, when, the greater part of the trees bordering the public roads, at the time when they ought to display to the best their bright green foliage, looked devoid of leaves and the few that were left on them were crumpled and blackened as if a blight had passed over them.

I have not studied the cause of the disease, but I should judge that is it due to a species of "Aphis" from which all the trees examined were suffering.

A. C. G.

Starlings.

I'll have a starling shall be taught to speak.
HENRY THE FOURTH

It is Sunday morning, and I have been watching the starlings. Nature has no fourth commandment in her decalogue, and all her children are industriously busy, some of them anxiously so; but none seem to me so terribly in earnest as my friends the starlings. From a window at the back of our house I look from under a canopy of still leafy, though autumn-tinted trees, on to a stretch of close cut grass—grass that a few weeks ago was all parched, patched, and brown, save where the undying dandelion showed his too-frequent head and bloomed, but which is now moist and thick, and of as lively and as grateful a green as a cloth of emerald velvet. This is the dear paradise of the birds when the Sabbath shuts it out from human intrusion. Here the great ironclad of a rook comes sailing down, wheeling in close irregular order with his fellows but never once colliding with them, and always laying his head to the wind before the dumps himself to the ground. Here the thrushes, handsome and lustrous-eyed glide along the turf, and play the tug-of-war with many a hapless worm. Here the thrush's less frequent and more timid cousin—the last to venture, and the first to fly—the glossy blackbird darts stealthily into view, now stooping to ply his orange beak, now nervously lifting his head to catch the first sight or sound of approaching danger, and now with needless fear skimming the quiet lawn, and making straight for a bushy concealment, uttering as he goes those sharp staccato cries of alarm that startle while they please the ear, they seem so like a martial challenge. The yellow and the pied wagtails are gone, with their ceaseless pulsations, their shrill, pitiful notes and their swift, devious trespass about the grass as they snap now right now left, with their unerring beaks at the light insects sporting for them in the sun. But the plentiful, perkey sparrow is here, and hops—I wish he could be evolutionized into a walk—hops impudently about, so noisily in evidence with his tuneless "cheep, cheep" that I think the poor crumpled moth with which he flies off must be as silly in the sunlight as we know him to be in the candlelight.

And here, as I say, in busy numbers come my friends the starlings and it is the starlings I have been specially watching. I know them of old. When I was a boy I both admired and envied them Far in the autumn. when I rambled amongst the Southdown slopes, where the mild black-faced sheep cropped the dwarf grass that is so conducive to tenderness in mutton, the starlings were there in hundreds, the undisturbed companions of the fleecy flocks. They run about fearless amongst the bleating sheep, and I thought it must be the end of all their careless joy when they mounted the sheep's soft back and burrowed their beaks in the woolly coat as they gaily rode along. The shepherd with his crook was my friend, and many a time, not telling him of my thoughts, I have sat down with him on a furzy bank and compared him with the shepherd that stood at home on the mantelpiece. But friend as the shepherd was to me, lending me his crook to catch a sheep or a lamb at my will, he was a greater friend

I think, of the starlings, for he believed that they were friends of his fleecy charge, delivering them from the grops of insect life which infested their skins, and which helped, he thought to breed the maladies from which I sometimes saw them sadly suffering. When I came northwards I was delighted to find that in these parts the starling was known by the homely name of shepster. The word rekindled happy thoughts and feelings, took me back to the hills that overlooked the sea, to the shepherd and his flocks, and to the starlings, of which even timid sheep were not afraid.

The starlings that I have been watching are all old birds, as their plumage and the vigour and skill of their search for food all tell. They are not in quite as good condition as they will be in a few weeks' time. Their domestic duties during the season have been arduous and long continued, and the weather has tempted some of them, I really believe, to rear three families in the season. The neatness and burnished lustre of their feathering have been interfered with, too, by their countless journeys in and out of the narrow crannies in which they have made their scrambling nests and reared their greedy young. But when the morning sun has caught them at the right angle their feathers have still looked beautiful, flecked as the bird is from beak to tail with its own peculiar markings, which though they do not look like stars, except collectively, have given him, as a friend declares, his Saxon name.

At any, Nature has been thoughtful for the social position of my unpretentious friend, and has clad him, let us believe, for a purpose, in his suit of bountifully spangled, darkt rich watered silk. For otherwise the starling is not a handsome or an aristocratic bird. The lines on which he is built are not specially graceful. He has, too, a habit of shaking his feathers roughly out and leaving them so, and a further habit of opening his mouth and keeping it open; and when he indulges both habits at once he wears a very unkemped and quite an uncanny appearance. He has no leisure and no variety in his movements, whether he is in the air or on the ground. Of course he cannot help his appetite, which is insatiable from the time he quits his shell to the time he quits his place in nature; and it is this appetite of his which knocks all the aristocracy out of his character and his ways.

See him as I have seen him this morning. Here he comes, with no variety in the rhythm of his labouring wings. There are no leaps and darts through the air; no graceful curves, impressing us as does the flight of many birds, with the sense of the joyous spirit that lives in nature, and makes mere existence an ecstasy.

And now that he has alighted notice his utter disregard of deportment. Compared with his paddling trot along the turf the strut of that neighbouring rook is statelinessitself. His hurrying impatience to find something to eat makes you feel that he sees nothing to admire, and has something distressful about it. It suggests hunger, and hunger suggest poverty, and poverty provokes—ought to provoke—pity. There is almost a tremble in his haste as he stabs the ground and bores it with his coloured bill, tapping, it seems, any likely and unlikely spot in the grass. Now he has dropped upon a grub; and, as if it were the first morsel that fortune had brought him in the hungry day, down goes the grub with a ravenous gulp, and the hasty search is instantly renewed. He robs himself of half the joy his fortune offers him by allowing himself no time to reflect upon it. His whole being is centred in finding and eating grubs.

This, doubtless, is his useful place in Nature's economic scheme; and right well he fills it. For this he is the farmer's as well as the shepherd's friend. I know that if need be he can eat grain, for I have seen him doing it this season; and last winter we had two of his class in the distressed company of birds that came to us for daily doles of meal and breadcrumbs. And the artist who has painted the picture in the present art Gallery Exhibition containing a very pretty, if a little too flattering portrait, of my friend "going for" a dish of cherries, scarcely does the starling an injustice, though a blackbird would have been more true to nature, and therefore more true to art.

But as a farmer I sometimes talk with says, "grubs is the grubs for shepsters." And so, if I have been tempted, any time from my youth up until now, to look down upon the anxious, unleisurely starling as a gluttonous, plebian bird, destitute of personal pride, and scarcely happy even

when grubs are many, and he has them all to himself, I hereby apologize to all the race, moved to do so by the conviction that whatever fills earnestly its place in nature is fit subject for honour or for praise.

This year, as in many others, I have marked the passionate devotion of the starlings for their young; I have watched them here singling out from a little Bedlam of shrill whirring cries, the call of their own particular young, as the sheep do with their lambs; and since that time in has delighted me to watch the well-grown but not yet feather-beautiful youngsters practising their flights in swaying clouds, making, as Nature so often does, that beautiful collectively which single is uninviting. The understanding was perfect with which they manœuvred in unbroken columns in this field of air; and the interest in the sight was enhanced by the sough of their wings and the "burr" from their throats whenever they swept earthwards and rushed, close by me to tell me that life is happiness, at least when life is young.

I have not, like Owen Meredith, written an ode to my star-spangled friend, but I have never slit his tongue to double his faculty for talking, and I have never imprisoned him, even so comfortably as he is imprisoned at Belle Vue, that he might cry like Sterne's in *The Captive*—"I cannot get out." And when the leafy trees are bare through which I have watched him this morning, and the winter has fully come whose icy arrows strike to the frozen hearts of the shelterless birds, I promise to feed bountifully the trustful starling if he will come to my door, as the starlings came last winter; and when his meal is done, and from some neighbouring tree he tries between the intervals of his toilet, to make low but grateful utterance of his thanks, I will hope, and bid the starling hope, for the return of those brave sunny hours which both the birds and I have known this peaceful Sabbath morning.

A. Walker.

On the Occurrence of Echeneis Naucrates in Maltese Waters.

A fine specimen of a sucking fish or Echeneis, which was caught in the Grand Harbour some time back, has been presented to the Malta University Museum by Cap. John Francia R.M.M.

It measures 14½ inches in length, and its suctorial disc, which is 2½ inches long and $\frac{8}{10}$ m. broad, has 21 laminae.

It belongs to the species *Naucrates* which is considered by Dr. E. Moreau as extremely rare in the Mediterranean. Of this species no mention is made by the late Prof. Gulia in his "Tentamen Ichthyologiae Melitensis" although he admits the more common "Echeneis Remora" with the indication that the number of the laminae in the Suctorial disc is variable "uti recte monet Princ. Bonapars." As the actual number of laminae is not mentioned by Prof. Gulia, which number being greater or less than twenty is nowadays considered as a specificcharacter, we have no means of ascertaining whether the Echeneis *Remora* of his Catalogue is different to the one now classified as *Naucrates* in the Ichthyological Collection of the University Museum.

N. Tagliaferro.

A Novel Industry.

A writer in the *Petit Journal* gives an interesting account of a new industry which has just been started at Besancon, in France, where wood pulp is converted into soft silken thread.

"I am going to tell you about the most astonishing thing, the most surprising, the most marvellous, the most miraculous, the most triumphant, the most astounding, the most extraordinary, the most incredible, the most unexpected the most prodigious, the most unique, the most brilliant and the most worthy of imitation and envy of this century—it is the invention of Count de Chardonnet, by means of which wood pulp or cotton is coverted into durable, luminous and elastic silk."

For a long time after its dicovery the process and system of M. de Chardonnet remained concealed in his laboratory. It made its first appearance at the Exposition of 1889, where it received the highest

award that the jury could give. Connoisseurs, savants and manufacturers were greatly interested in it, though it had not reached the degree of perfection to which it has been brought to-day.

The great question, that which leads all others since the new invention tends to produce a revolution in one of the greatest of French industries is, can this discovery be utilised for the growing needs of the people?

A complete answer in the affirmative has been given to-day by M. de Chardonnet, who has already, by enlisting the symphathies of several business men, built a mill at Besancon, where the "silk" is being manufactured. Raw material is made froom wood pulp, such as is used for the fabrication of certain kinds of paper. This pulp is carefully dried in an oven and plunged into a mixture of sulphuric and nitric acids, then washed in several water baths, and dried by alcohol.

The product thus prepared is dissolved in ether and pure alcohol, and the result is collodion, similar to that used in photography. This collodion which is sticky and viscous, is enclosed in a solid receptacle, furnished with a filter in the lower end. An air pump sends compressed air into the receptacle, and by its pressure the collodion is passed through it horizontally. This tube is armed with 300 cocks, of which the spouts are made of glass, and pierced by a small hole in the diameter of the thread of a cocoon as it is spun by the silkworm.

The spinner opens the cock, and the collodion issues in a thread of extreme delicacy (it takes six to make a thread of the necessary consistence for weaving). This thread is not, however, fit to be rolled on spools by reason of its viscosity and softness. The matter is yet as collodion, and not silk. To produce the necessary hardness the inventor resorted to a very ingenious but simple method. The little glass tube already mentioned is surrounded by a small reservoir of the same material constantly filled with water; when the thread issues from the aperture in the manner described, it traverses this water, which takes up the ether and alcohol, and the collodion becomes solidified, that is to say, it is transformed into an elastic thread, as resisting and brilliant as ordinary silk.

One more detail. On account of the materials employed in the manufacture of this silk—wood ether and alcohol—it might be rightly supposed as was mentioned in the former report, that the stuff manufactured would be dangerously inflammable. M. de Chardonnet has apparently obviated such a contingency by plunging the spun thread in a solution of ammonia thus rendering it as slow combustion as any other material.

Another practical difficulty to be remedied in the invention is the frequent snapping of the slender threads issuing from the cylinder by reason of unequal pressure. This makes it impossible to maintain a standard quality for the output, and, consequently there may be produced five pounds of excellent silk folllowed by five pounds of a comparatively worthless quality. This difficulty is being overcome, but until it is completely removed men of large means will not invest largely in the stock of the company which has been formed to exploit Count Chardonnet's invention.

Up to the present time none of the rich and important silk men of St. Etienne and Lyons have invested heavily in this enterprise. They all profess to believe in it, and declare that in a few years artificial silk produced by this process, when it shall have been somewhat improved in certain details, is destined to figure largely in the commercial world.

The disposition to-day on the part of French capitalists is to await developments. When the process is once perfected, and its results are wholly satisfactory, there will be a lively struggle for the control of this valuable invention, and there seems to be no doubt of the ability of the inventor to remove every obstacle which stands in the way of perfect practical success.

Sui Limacidi dell'Algeria.

Prof. C. Pollonera.

Sotto questo titolo comprendo i generi di molluschi terrestri nudi appartenenti alle famiglie *Arionidæ* e *Limacidæ*. Da quest'ultima famiglia escludo il genere *Parmacella*, perché la conchiglia opercolata che esso possiede nel suo primo stadio di vita mi sembra indicare una provenienza abbastanza diversa da quella dei veri Limacidi.

Parte del mio materiale di studio su questa regione la devo alla cortesia dei signori Hagenmüller da Bona, Lallemant da Algeri e Tournier da Oran, e parte dalle raccolte fatte dal Prof. Camerano nel suo breve viaggio in Algeria. Ho potuto così esaminare la maggior parte delle specie già indicate dagli altri autori, alle quali ora posso aggiungerne tre altre. Le specie, che non ho ancora potuto esaminare *de visu*, sono: *Limax subsaxanus*, *Geomalacus*, *numidicus* e *Atlanticus* Bourguignat.

Fam. LIMACIDÆ

Limax *(Plepticolimax)* **flavus** L.

L. flavus L., Syst. Nat., ed. X. 1758, p. 652.
L. variegatus Drap., Tabl. Moll., 1801, p. 103.
L. Deshayesi Bgt.,Limac. algér., in Rev. Zoll., 1861, pl. I, f. 1, 2.
— Malac. algér., 1864, p. 37, pl. I, f. 3-4.
L. Deshayesi et *Companyoi* Bgt., Lallemant, Malac. envir. Alger. in Ann. Soc. Malac. Belgique, 1868. t. III, p. 23.

Hab. Cherchelle (Desh.), Algeri (Forbes, Bgt., Lall.); Bona (Hagenm.). Nella Monogr. dei Limac. ital. ho già detto come il nome di *L. Companyoi* sia stato dato dal Bourgnignat a questa specie per aver egli preso egli troppo alla lettera la descrizione poco esatta del *L. variegatus* data dal Draparnaud. Gli esemplari poi che ricevetti dal Dott. Hagenmüller col nome di *L. Deshayesi* rientrano pure completamente nella stessa specie.

Malacolimax nyctelius Bgt.

L. nyctelius Bgt., Spicil. Malac. (Rev. Zool.), 1861, p. 41, pl. II, f. 3-4. L. Malac. Alg., 1864, p. 38, pl. I, f. 1-2.
M. nyctelius Pollonera, Boll. Mus. Torino, 1887, N° 21; 1890, N° 74.

Hab. Nella maggior parte dell'Algeria, tanto presso la costa come nell'interno.

Bisogna notare che il Bourguinat figurò e descrisse un esemplare giovane, poiché il *M. nyctelius* raggiunse le dimensioni ordinarie del nostro *Agriolimax agrestis*. Inoltre esso dice che l'apertura respiratoria e molto anteriore; il che non e affatto, poichè nei numerosi individui da me esaminati l'apertura è, come nelle altre specie dello stesso genere, latero-posteriore. Forse il suddetto autore, facendo la sua descrizione, ebbe tra le mani un esemplare a cui era stata divorata in parte la porzione anteriore libera del cappuccio (cosa non rara nei *Limax*), cosicché l'apertura respiratoria veniva a prendere in apparenza una posizione latero-anteriore.

Malacolimax Raymondianus Bgt.

L. Raymondianus Bgt., Spicil. Malac., 1861, p. 39, pl. II, f. 1-2 — Mal. Alg., 1864, p, 38, pl. I, f. 5-6.
Amalia Raymondiana Simroth, Vers. Naturg. deut. Nackts., 1885, pag. 342.
M. Raymondianus Poll., Boll. Mus. Torino, 1890, N° 74.

Hab. Contorni d'Algeri (Desh., Bgt., Lall.), e di Oran (Tournier).

Malacolimax Brondelianus Bgt.

L. Brondelianus Bgt., Spicil. Malac., 1861, p. 37, pl. II, f. 5-7.
Krynickillus Brondelianus Bgt., Mal. Alg., 1864, p. 43, pl. I, f. 9-11.
Agriolimax Brondelianus Heyn., Die nackt, Landpulm., 1885, p. 87.
M. Brondelianus Poll., Boll. mus. Torino 1890, N° 74.

Hab. Contorni d'Algeri (Bgt., Lall.), di Oran (Tourn.) e Cascate del Safsaf presso Tlemcen (Tourn.).

Malinastrum? subsaxanum Bgt.

L. subsaxanus Bgt., Spicil. Malac., 1861, p. 42.
Krynickillus subsaxanus Bgt., Mal. Alg. 1864, p. 44, pl. III, f. 13-16.

Hab. Contorni di Costantina (Raymond), e di Algeri (Lall.).

Non avendo mai potuto osservare questa specie, e mancando su di essa ogni dato anatomico, non posso decidere a quale genere appartenga. Accetto dunque provvisoriamente il nome di *Malinastrum* imposto dal Bourguignat alla sezione del gen. *Krynickillus* alla quale essa dovrebbe appartenere, secondo il suo autore, a cagione della *granulosità* del cappuccio. Confesso però che ho dei forti dubbi sulla realta di questo carattere, che forse ad un nuovo esame potrebbe scomparire, come già scomparve nei *L. Doriæ* e *melitensis*.

Agriolimax agrestis L.

L. agrestis L., Systs. Nat., ed. X. 1758, I, p. 652.

Hab. Presso le Cascate del Safsaf nelle vicinanze di Tlemcen (Tournier). Perfettamente tipica, e della statura usuale degli individui europei.

Questa specie era già stata citata dell'Algeria da parecchi autori (Terver, Morelet, Debeaux, ecc.), ma il Bourguignat la escluse dalle specie algerine, riportando il *L. agrestis* dei suddetti autori al suo *L. nyctelius*. Io non la conosco che della suddetta località in Algeria, ne fu trovata dal Camerano nelle provincie di Algeri e di Costantina, ne fu raccolta dal Touanier nei contorni di Oran.

Amalia scaptobia Bgt.

L. scaptobius Bgt., Spicil. Malrc., 1861, p. 43.
Milax scaptobius Bgt., Mal. Alg., 1864, p. 49, pl. III, f. 8-12.

Hab. Contorni di Costantina (Raymond), di Bougie (Forb.) e di Algeri (Lall.).

Le figure e la descrizione di Bourgnignat si riferiscono ad individui giovani, poichè questa specie raggiunge le dimensioni ordinarie della *A. gagates*. Essa è di un color biancastro sporco fondamentale; il cappuccio è cosparso di una fitta e minutissima punteggiatura nero-bruna che si fa più grossolana e più densa verso il centro, e *non ha* fascia scura lungo il suo solco; il dorso è pure minutissimamente punteggiato di nero-bruno, più radamente sui fianchi e molto più fittamente verso la carena, il vertice di questa, ed i solchi del dorso restano della tinta pallida fondamentale.

L'apparato sessuale ha la ghiandola prostatica bene svilluppata delle *Pirainea* ma differisce da quello delle specie segueuti per la verga più lunga, più ripiegata e molto meno grossa. Si distingue pure per la piccolezza della limacella (mill. $1^2/_3$), che é ovale, semplice e sottilissima.

Ne ho avuto un solo esemplare mandatomi dal signor Lallemant da Algeri insieme a molti della specie seguente, dalla quale si distingue all'esterno per la sua punteggiatura più minuta, e per la mancanza di fascia scura lungo il solco del cappuccio.

Amalia insularis Less. e Poll.

A. insularis Less. e Poll., Mon. Limac. ital,. 1882, p. 51, tav. I, f. 32-23.

A. *Typica*. Dorso e cappuccio invasi da una tinta nerastra, sparsa disugualmente, cosicchè lascia sussistere delle piccole macchie del colore pallido fondamentale; sommità della carena pallida; una larga fascia nera a margini irregolari lungo il solco del cappuccio.

Hab. El-Hammam e Fort National (Camerano). Questa specie somiglia moltissimo a certe varietà della *A. carinata*, ma se ne distingue per l'apparato sessuale che è al tutto simile a quello della *A. gagates*.

B. Var. n. **algerica**. *Differt a forma typica clypeo distinctius pallido et nigro maculato, dorso atriore, sulcis pallidis.*

Hab. Algeri (Lallemant). Il sig- Lallemant me ne inviò un discreto numero di esemplari, il che dimostra che questa specie non è rara colà, eppure nel suo citato lavoro esso non annovera di questo genere che le *A. eremiophila* e *gagates*, colle quali non è possibile confonderla.

Amalia cabiliana n. sp.

Varietati plumbea Amaliæ gagates *proxima, a qva differt statura minore, carina vertice albida, clypeo zonis duabus nigris sulcum concomitantibus. Long. in alcool 25 mill.*

Hab. Tl-Hammam nella Cabilia (Camerano)-

L'apparato sessuale è identico a quello della *A. gagates*. Dalla *A. Doderleini* di Sicilia differisce per la statura minore, per la tinta nerastra del dorso e del cappuccio, e per avere i solchi del dorso pallidi invece di averli nerastri come in quella; inoltre la fascia nera che segue il solco del capuccio è meno regolare e meno visibile.

Amalia gagates Drap.

L. gagates Drap., Tabl. Moll., 1810, p. 100.
Amalia gagates Heynemann, Malak. Blätt.. 1861.

Hab. Constantina (Raym.), Tlemcen (Mor), Aïn-el-Haout (Desh.), Algeri (Lall.), Oran (Tournier).

Amalia eremiophila Bgt.

A. eremiopilus Bgt Spicil. Mabac., 1861, p. 38, pl. I, f. 3-4.
Milax eremiophilus Bgt., Mal. Alg., 1864,p. 46, pl. I, f. 7-8.

Hab. Cherchell (Desh.), Algeri (Lall.), Bona (Hagenm.).

Fam. ARIONIDÆ

Geomalacus *(Letournexia)* **numidicus** Bgt.

Letourneuxia numidica Bgt., Moll. nouv. lit., 1866, p. 201, pl. 34, f. 1-7.
G. numidicus Morelet, Faune Malac. Maroc., Journ. Couch., 1880, pag. 16.

Hab. Presso le Cascate del Safsaf presso Tlemcen (Bgt.)

Geomalacus *(Let.)* **Tournieri** Poll.

G. Tournieri Poll., Rec. Arion., Boll. Mus. Toino, 1890, N° 17, p. 38.

Hab. Contorni di Oran (Tournier).

Geomalacus *(Let.)* **arlanticus** Bgt.

Letoourneuxia atlantica Bgt. in Pechaud, Excurs. Mal. N.Afr., 1883, pag.6.

G. atlanticus Poll., Rec. Arion., Boll. Mus. Torino, 1890, N° 87, p. 38.

Hab. Presso le Cascate del Safsaf presso Tlemcen (Pech.).

Il Bourgnignat (Malc. Alg., p. 33) cita ancora, sulla testimonianza di Aucapitaine, l'*Arion rufus* dell'interna dell'Algeria, ma siccome nè questa, nè alcun'altra specie del genere *Arion* fu mai più ritrovata in tali regioni, così è assai probabile che il supposto *A. rufus* sia un *Geomalacus*.

Method of taking Plaster Casts of objects of Natural History.

At a recent meeting of the Manchester Microscopical Society Professor Boyd Dawkins F.R.S., exhibited a number of casts in plaster of Paris of various objects of natural history, and explained the process by which anyone can make them for himself. The material of the mould is artistic modelling wax, which is a composition akin to that which is used by dentists. And as it becomes soft and plastic by the application of heat, though in a cold state it is perfectly rigid, it may be applied to the most delicate object without injury. As it takes the most minute markings and striations of the original to which it is applied, the microscopic structure of the surface is faithfully reproduced in the cast. The method is briefly this:—

1. Cover the object to be cast with a thin powder of steatite or French chalk, which prevents the adhesion of the wax.

2. After the wax has become soft, either from immersion in warm water or from exposure to the direct heat of the fire, apply it to the original, being careful to press it into the little cavities. Then carefully cut off the edges of the wax all round, if the under cutting of the object necessitates the mould being in two or more pieces, and let the wax cool with the object in it, until it be sufficiently hard to bear the repetition of the operation on the uncovered portion of the object. The steatite prevents the one piece of the mould sticking to the other. The original ought to be taken out of the mould before the latter becomes perfectly cold and rigid, as in that case it is very difficult to extract.

3. Then pour in plaster of Paris, after having wetted the moulds to prevent bubbles of air lurking in the small interstices, and if the mould be in two pieces, it is generally convenient to fill them with plaster separately before putting them together.

4. Then dry the plaster casts either wholly or partially.

5. Paint the casts in water colours which *must* be fainter than those of the original, because the next process adds to their intensity. The delicate shades of colour in the original will be marked in the cast by the different quantities of the same colour which are taken up by the different textures of the cast.

6. After drying the cast steep it in hard paraffin. The ordinary paraffin candles, which can be obtaind from any grocer, will serve the purpose.

7. Cool, and polish the cast by hand with steatite.

The result of this process is far better than that obtained by any other. The whole operation is very simple, and promises to afford a means of comparison of natural history specimens in different countries which has long been felt to be a scientific need. Casts of type specimens may be multiplied to any extent at a small cost of time and money, and are as good as the original for purposes of comparison, and almost as hard as any fossil.

Professor Boyd Dawkins has employed it for copying flint implements, fossils, and bones and teeth which can scarcely be distinguished from the originals.

The Orange Disease in Cape Colony.

Ceratitis citriperda—*(Mac Leay).*

By S. D. Bairstow, F. L. S.

(Continued).

Along with Dr. Chute I made a careful examination of the legless maggot under a high power,

"Whilst we may not be permitted to use the term "legs" and whilst the nameless obscure appendages are, so to speak, most often invisible to the naked eye, they are nevertheless existing facts as rudimentary propellors, and when the larva leaves its juicy host for a final pedestrian tour, it does certainly use them to a certain extent, awkwardly 'tis true—but there nature does all things well! This maggot is not provided with useless appendages. All its strength is centred in the head—which depend only on the tail for one movement—spring assisting—around which the body would revolve on a smooth surface unless some balancing assistance were provided. Perhaps before apricots and peaches were bitten by the teeth of a man, *Ceratitis* was a happy well-built long-legged maggot. Its legs have gone. The stumps alone remain and they are of use but once in a life-time—in walking to the mausoleum. I should describe the larva as having ten pairs of submerged legs; seven pairs palpable under high microscopic power, (1) diminishing toward the head. The two powerful and very prominent black hooks are propelled by parallel sinews, levered about by muscular adjuncts and assisted at either side or upon either shoulder by a ninefingered hand, the digits being narrowest at the base. It is likely that these hands are really used by the maggot for balancing its body upon the semi-liquidized masses of congregated particles, whilst the hooks are engaged in ripping down the juicy food. I do not perceive any connection between these remarkable provisions and the power of springing, which is referred to by Prof. Westwood as being similar to that exercised by the cheese hopper, *Piophila casei*, a larva of another dipterous fly, belonging to the same family, (*Muscidæ*), as our common house-fly. In the larval stage I cannot discern a single weak point up to the period of the maggot's departure from the fruit, to favour our work of prevention or destruction, as the grub is merely a more pronounced epitome of its first state, and an active destroyer instead of a dormant traitor.

Viewed with the naked eye or under low microscopic power, the maggot is decidedly un-attractive and ordinary, but under higher powers where the partnership and connection of the two locomotive provisions are conspicuously portrayed, where the "mouth armature, two curved hooks, curious hand-like processes, by which they cling on to give themselves a purchase to work with the cutting hooks" (*Dr. Chute*) the marvellous maze of an intricate nerve system, [the alimentary canal and rudimentary legs are all clearly delineated], we can only exclaim "every natural atom is a prodigy of mechanical skill!" In science there is a deeper depth beyond the deepest known depth, a bottom we can never reach.

Dipterous chrysalids do not as a rule impress our minds with extensive feelings of admiration, as do some butterfly pupæ, nor call forth any peculiar necessity for observation in the order of insects of which *Ceratitis* is a noteworthy representation. "The pupa is a small, hard, brown, oval body, the outer surface scarely indicating any traces of articulation, being the dried skin of the larva, within which the real pupa is enclosed." Thus writes Prof. Westwood, and there is little to add. It is of an amorphous kind bearing no indication of identity or resemblance to the imago. It neither eats, flies, leaps, nor runs. The abdomen has no power of movement independent of the thorax, and as a buried being, this brown, ordinary, dead yet living creature, has no need for locomotive organs. It silently awaits a natural law until the final completion and expiration of its enforced imprisonment developes a force within, to break its bondage. When the fly emerges from the pupal coffin, we generally find an empty case broken in half, capped at either apex, and always spilt across, not lengthways. I have often seen the newly hatched fly walking up towards the top of my breeding-cage, and with its legs working off the empty encumbrance. Of course there are present, although almost invisible, strong articulations, which assist in the insect's resurrection. There is no web spun by the larva. It has no function, and small discretion is used in the choice of a hiding place. By physical disability the grub is handicapped, and in that stage is possessed of few personal adornments, but in the grand consummation which now attracts us, we find glorious changes of structure, beauties and intricacies, not readily surpassed by one species of the order. The pupa is similar to *Soronia*.

(1) Slight swellings may be seen with the naked eye.

"Mark, while he moves amid the sunny beam,
O'er his soft wings the varying lustres gleam.
Launched into air, on purple plumes he soars,
Gay nature's face with wanton glance explores,
Proud of his varying beauties wings his way,
And spoils the fairest flowers, himself more
fair than they."

Haworth.

Having admitted there is little scope for us in attacking the ovum, or the larva, whilst the fruit is still suspended on the tree, it will afterwards be seen that we can take advantage of the pupal or quiescent stage, and come down upon our sleeping enemy with effect.

The imago is thus described by Professor Westwood (1):—

"General colour fulvous buff, with the thorax grey spotted with black, with an undulated white line at the base, and two pale grey bars across the abdomen; the basal half of the wing is much variegated with minute black dots and streaks, with a buff and ashy cloud near the base another across the middle, another along the extremity of the fore margin, dotted with black, and an ashy bar on the inner margin. The male is singularly distinguished by having two slender filaments arising between the eyes, knotted at the tips, a peculiarity which we believe is possessed by no other dipterous insect, and which is wanting in the female. In the specimen sent me this peculiar growth might be exactly described, in the words of Macquart, as a filament terminated by a rhomboidal plate. (2) When I first reared them in my breeding-cage, the following points of structure and economy impressed me forcibly:—For example —the male:—

1. Its magnificent irradiating milky tinged azure eyes,—a sight to behold; (this is of course—a sketch at a distance, magnified)

2. The peculiar rhomboidal-plated filaments on the head, so tersely described by Macquart.

3. The yellowish white conspicuous face.

4. Wing lustre, and singular manner in which the costal margin is slightly reflexed near the thorax and the tip of the wing is never raised above the plane of the head, declining always from the joint.

5. Yellow body, which darkens after copulation almost to rufus tint.

6. A persistent habit of wing-wiping with its legs is perhaps applicable to most of the *Diptera.*

7. Wing markings and coloration are stronger and more pronounced than in the female.

The thorax very much reminds me of that of *Acherontia atropos, Curt.*—Death's head hawk moth, whose markings, are supposed to resemble a skull and cross bones, a most harmless and inoffensive insect, purely suctorial, yet generally believed in the Colony to be armed with a sting and and therefore highly dangerous. The dots and streaks at base of wing lend a pleasing break to what would otherwise appear an unremarkable neuration, plain and simple. Dr. Chute very aptly describes the ovipositor of female as "a poem" and the head and tongue "a strain of heavenly music." If so the rainbow must have been inspired after a private view of *citriperda's* eyes. The ovipositor of the female is a most powerful weapon, it is a sword within a scabbard—a concealed auger, and the orifice of detachment is situated below the point. To regard the magnified representation of the lancet without a knowledge of proprietorship, we should be pardoned in mistaking it for an exquisite little bit of Sheffield workmanship rather than the entrance piercer of a fly's ovisac. Since my reference to the ovum, I have discovered an excellent method of enticing oviposition, viz:—By slicing a piece of pear and suspending the greater portion to the top of the breeding cage; flies are attracted and induced to arrange their mundane affairs. They are diurnal, sun-loving insects reposing mostly beneath the leaves of trees by night and are very seldom seen in copulation. Soon after connection, the male sickens as if attacked by some severe rheumatic paralytic affection, or temporary insanity, and after a few senseless, and objectless flights, tumbles to the ground and dies. It is not easy to ascertain the time occupied in the various changes, as they vary extensively according to the nature of food-host and circumstances generally. The following estimate may be taken af a fairly accurate average, in excess rather than in deficiency.

(1) Gardeners' Chronicle, *"Orange Fly," Sept. 9, 1848.*

(2) Pelaphora capitata, Tripeta capitata, *"Wied v. Auss. Zweifl., No.* 3." *"Histoire Naturelle des Dipterès" ,Macquart, vol. ii., page 454.*

From eggs to mature larva	14	days.		
„ larva „ „	pupa	2	„	
„ pupa „ „	imago	16	„	
Total		32	days.	

I have specimens which took 32 days in passing from pupa to imago.

Operations were commenced in September 1892, with specimens sent by Mr. Newman of Cradock, pupæ in oranges. After rearing out the flies I alternated the food of four successive generations between apricots, peaches and pears. The fourth brood hatched out February 18., into larvæ,and fed upon pears which were slightly sliced to facilitate breeding, and the stalks placed in water so as to give ample chance for maturing. At this period it seems to be much hardier and easier to rear than in the earlier seasons. Indeed, I may say, that each respective brood carries more individual strength of vitality as if to guarantee an extra numerical potency to cope with the climatical dangers of a very ticklish period,—prospective hibernation.—So many succumb to phyical and other disasters that nature must now provide an extra populative production. Of this fact there can be no doubt, and by frosts and weather changes, the initial appearance is extensively regulated. I was constantly informed of this prophecy last season that we should not have an early appearnce of the pest owing to late frosts and the statement was fully borne out by subsequent proof. Equally certain is it that only in the high and cold districts of the Colony where fruit cannot be obtained year by year, is there an absolute exemption from maggot. A regular supply of food is vital.

"First instalment of apricots not infected, but later ones certainly are. Every late peach is maggotted."—*Dr. Elivs Key.*

"It is curious that some seasons are much worse than others, and no doubt the winter and spring are in same way the cause, but how I have not been able to ascertain."—*J. R. Sim.*

"I can assure you that we shall have a better early season this year because of late frosts last year."—*Leslie Uitenhage.*

This opinion was not quite accurate, as I found maggots in the early Uitenhage apricots which increased numerically in the later fruits. However I must concede an opinion slightly antagonistic to the cold theory. I think that a sudden and violent change in the weather is responsible for a heavy death-roll. If we place a *Ceratitis* fly in a muslin topped glass tube and deposit it for an hour between lumps of ice the fly will after being extracted therefrom and subjected to the heat of the sun recover from an apparent trance or numbness, and appear quite lively but in ten minutes it is a corpse. The change is too much and the violence of treatment too severe for its system. But it can stand the cold, and it is eminently fitted for hibernation *i. e.*, living through the winter in a state of semi-torpidity and abnegation, neither sucking the juicy nectar of a tempting calyx, nor pursuing its course of love in sylvan glades.

(To be continued).

Hints for Young Collectors.

The following extract is from the pen of the Rev. Dr. Bayard Klein, D. Sc., F. L. S. It will no doubt be of some assistance to the younger readers of the Mediterranean Naturalist.

I.

Geology.—Every mine, quarry, natural or artificial section of the ground is worth visiting. There, all minerals should be collected, whether crystals, pieces of the rocks, pieces of coal, or coal-looking substances. Some description of the rocks, of mountain, or level ground from which the specimens were taken should be supplied.

Fossils.—Many plants, shells, bones of animals, &c., are often discovered in quarries or rocks, when observed more attentively. These fossils are always of the utmost importance, and as many of them as can be conveniently obtained should be forwarded. Fossil bones are often to be met with in caves, along the banks of rivers, often at a considerable height. They should be taken just as they are in the clay or sand that contains them, and carefully packed in boxes with full indications of the locality. The same remarks apply to all other fossils. Shells not be rejected because of their similarity to others, as it is difficult, without great experience, to make sure of their identity, and thus some rare and precious specimens might be rejected and lost.

II.

Botany.—All plants should be dried in paper as soon as possible after being gathered, care being taken that the flower, if possible, be present in each specimen, as well as leaves and roots. Attention is to be paid to the fact that leaves are not always similar on the same plant. Each kind of leaf ought then to be secured. On the double sheet of paper which contains a specimen, the date of discovery, the place, and if possible the hour when gathered, as well as the name of finder, are to be noted. Plants may be divided, for collecting purposes, into the following groups: Marine plants—(algæ). Fresh-water plants—(fresh-water algæ and phanerogams, *i.e.* flowering plants). Land plants — (flowering). Land plants— (flowerless). Among flowering land plants, those that are gathered *on mountains* should have it indicated on their paper, with the altitude, if known. Flowerless plants include ferns, club-foots, mare's-tails, fungi (mushrooms), lichens, and algæ. As the fructification in ferns is often carried on by special fronds, care should be taken that fronds, both fertile and sterile, are secured. It should be mentioned whether the fern is a low herb or tree-like in its proportions. Fungi may be preserved bottles or tin boxes. Marine algæ easy enough to fix on paper, but if time is wanting for this they should be simply washed in fresh water and rolled in a piece of paper when dry, with the usual indications. Only twigs of trees can usually be preserved by the traveller, but it should then be mentioned that they come from a tree of such size, height, &c., Roots of plants should accompany specimens as a rule, but in the case of bulbous plants, the bulb is, of course, indispensable in all cases. It may be found necessary to dry the plant independently of its bulb, but then some accurate means must be devised to secure easy identification of plant and bulb afterwards. *Parasitic plants* are always of great interest. All plants, therefore, seen living on trunks of trees, or generally upon other plants, must be taken, their connection with other plants being carefully indicated.

III.

Animals.—Many specimens of animals are extremely easy to secure and preserve for expedition to Europe. Others require a considerable amount of preparation. But generally speaking much time and trouble can be spared by having ready small casks or tin-cases, in which specimens can be stored in spirit—the only preparation required being to wash the specimens and to free them from dirt, mucosities, &c, before immersing them in alcohol. Fishes are thus very easily preserved, since they merely require washing and placing in alcohol. Birds require more care, and should be roughly stuffed before being packed. Small mammals, reptiles, batrachians, &c., map be treated in alcohol. At least the skeleton and skin of large mammals should be secured. All marine animals may be treated like fishes. Particular attention should be paid to molluscs. The *shells* are always valuable, but the animals contained in the shells should be procured also, if possible. It is sufficient to preserve the molluscs in bottles filled with alcohol. Shells should be washed and then packed in cotton or other soft substance, care being taken that both valves, in the case of bivalves, are well united by a thread. It is usual for Butterflies to place them in little triangles made of strong paper. They can thus easily be packed in boxes and kept there for a long time. The larvæ or caterpillars should not be overlooked. They are preserved in alcohol. Small insects don't usually require any special preparation. Echinoderms, star- fishes, all kinds of coral, polyps, medusæ, worms, are all important and only require to be placed in spirit. The preparation for vertebrate animals (Taxidermy) is always done better on the spot, when time allows of it. Those who wish to undertake this task will do well to procure some practical manual of Taxidermy. It is useless, perhaps, to mention that all bottles, cases, &c., should be hermetically sealed and all due precautions taken against damp. Many specimens are often destroyed owing to neglect of these precautions.

Notes and News.

A recent number of the *Bollettino del Naturalista* contains an interesting account of the capture of a sea cow *Pelaquis monachus* in the vicinity of Cagliari. It was taken to

Genoa; but it died in a few days. In the stomach were found four fish-hooks of different sizes together with fragments of the lines. The largest hook measured 3½ inches in length.

IT has been computed that upwards of 1,000,000 lbs. of grapes have this season been gathered in the Malta vineyards. If there be any truth in the old Turkish adage that " there is a devil in every grape " what a paudemonium Malta and its dependencies must be.

IN many parts of the province of Canton, China, the orange trees are infested with a species of worm, and to rid themselves of these pests the natives import ants into the groves. The ants are captured by holding the mouth of a lard-bladder to their nests.

They are then placed among the branches of the orange-trees, where they form colonies, and bamboo rods are laid from tree to tree to facilitate their movements from one part of the grove to another.

IN Tallack's " Malta under the Phenicians, Knights, and English " it it is stated (p. 178) that William C. P. Medlycott Esqr. an English gentleman who was for some years a resident in Malta, devoted much careful attention to the birds and fishes of the islands; and that he drew a series of very accurate coloured representations of the fish and crustaceans that had beeu found in Maltese waters. Can any of our readers inform us of the whereabouts of these drawings?

CAGLIARI, in Sardinia, now boasts a scientific society which is to be called the "Società tra i cultori delle Scienze mediche in Sardegna".

We wish it every success; and hope to hear from time to time of its, progress.

AN interesting discovery of Phœnician remains has we hear, recently been made during some excavations at Corradino hill.

We hope in our next issue to be able to give our readers some details of the find.

THE methods and implements used by the Maltese agriculturist are of a most primitive type, and no inducements that the government may offer will tempt him out of the groove in which his forefathers have walked since the days of Jacob. The plough, as a rule, consists of a pointed piece of wood, sometimes shod with iron; and as the cow, ox, or mule drags it over the soil, the husbandman presses it into the ground and directs its course. Equally primitive is the harrow which consists, as a rule, of a branch of the carob or of whatever other tree may be the nearest at hand.

THE current issue of the *Botanical Gazette* contains an interesting note on the causes of the splitting of the olive tree. This splitting which is very common in Italian, as well as in Maltese orchards, Dr. Robert Hartig concludes "is due to the decay of the tissues occasioned by the attacks of *Polyparus fulvus* Scop. var. *Olea.* Scop. The spores of this fungus gain access to the inner tissues of the tree through wounds; there they germinate, towards its centre by way of the medullary rays. A white rot

rapidly follows in the path of the fungus. In many cases wounds occur on approximately opposite points of the stem. Where infection takes place in both of these the decay and falling away of the fissues progresses from both to the centre, resulting eventually in the formation of an irregular opening through the trunk with sound wood on either side of it."

EGYPT has 3,450,000 date palms, producing 300,000 tons of fruit.

THE Maltese Islands have not a very extensive reptilian fauna. Land tortoises, turtles, lizards, frogs, and snakes are the principal representatives.

Of the snakes there are but two species *Coluber viridiflavus* and *Callopeltis leopardinus* which are indigenous to the islands, and both of these are harmless. They attain a length of two feet; and are so timid that it is difficult to approach them. "According to native tradition St. Paul banished all venemous snakes from Malta, as St Patrick is said to have done from Ireland, and the saliva of persons born on the festival of the Conversion of St. Paul is said to be efficacious in the cure of snake bites, as are also St. Paul's earth, and the *Ferra Sigillata Melitucæ*."

THE Fata Morgana, or sea mirage, is most perfect at the Straits of Messina, between Italy and Sicily.

IN view of the great prevalence of the disease known as *tapeworm*, in the Maltese Islands, the following statistics will not be without some interest for our readers. An inquiry by Bereanger Ferand shows that in 87 out of 100 cases of tapeworm in man only one parasite was present. In 52 out the 100 cases, the tape worm was at least five yards long and in six instances it was from 12 to 16 yards. In the remarkable case of a marine engineer who became infected at Madagascar, three tapeworms of enormous size were removed, their total length being 170 yards, and their weight nearly 30 ounces.

THE last issue of *Natural Science* contains among other interesting matter the following contributions. "The effect of the Glacial Period on the Fauna and Flora of the British Isles" by G. W. Bulman, M. A., B. Sc. "Some Recent Researches on the Habits of Ants, Wasps, and Bees," by G.H. Carpenter B. Sc., "The recent plague of Wasps" by O. H. Latter, M. A. "Biological Theories" by C. H. Hurst Ph. D.

"The Problem of Variation" by J, T. Cunningham M. A. "The British Association addresses 1893." etc. etc.

IT estimated in the last Census report of the Maltese Islands that 250,000 loads of clover *Hedysarium coronarium* are grown annually in the Maltese Islands. It is on this plant that the bees of the islands principally feed, and most of the beehives have therefore been erected in proximity to the clover fields. Some idea of the amount of work which the little creatures do in their collection of the juices of the plant may be gleaned from the fact that every head of clover consists of about sixty flower tubes, each of which contains an infinitesimal quantity of sugar. Bees will often visit a hundred different heads of clover before retiring to the hive, and in order to obtain the sugar necessary for a load they

must, therefore, thrust their tongues into about 6000 different flowers.

According to Lubbock a bee will make one hundred trips a day, and thus will draw the sugar from 600,000 different flowers in the course of a single day's work.

LOCUST-EGG oil, a commodity which is to be obtained from the eggs of the locust, is used considerably in Algeria for household purposes.

Of late years the French Government has annually employed the natives of the provinces to collect and to destroy the eggs of these destructive pests.

Now that a new use has been found for the eggs it is proposed to establish centres for their treatment for industrial purposes. The oil is of the consistence and appearance of honey; it burns well; and makes a good soap with alkali.

MONTPELLIER the rock city near Millan, France, is a singular piece of Natures carving. It is an isolated mass of stone, about 2500 feet above the sea and includes a section wonderfully like a towered citadel, around which are depressions, 300 or 400 feet deep, resembling respectively an amphitheatre, a necropolis, a parade ground, and a well-built city quarter, with monuments, gates and straight streets. The whole, about 500 acres, is surrounded by a natural wall.

IT has never been clearly ascertained what was the original parent of the peach, says *Mechans' Monthly*. It is, however, well known that the peach, the almond and the nectarine can all be developed, the one from the other; and it is, therefore, reasonable that all had the same origin. It has been supposed that the almond was really the antecedent of the other two. Recently, however, there has been found a wild plant in the north of China, which is considered a good species, and has been named *Amygdalus Davidiana* and it is believed that this is really the parent of the peach and its allies. All that is known of the peach and almond is that they were in cultivation as garden plants as far back as written history goes.

BIRDS as a rule, cannot focus their eyes on an object save at a considerable distance, and then only with difficulty, The reason for the singular fact is found in the position of the eye in the head, one being placed on each side and looking directly outward, so that they cannot be brought to bear on one object save, perhaps, at a very long distance, and directly in front. The truth of this statement may readily be demonstrated by anyone who has observed the ordinary fowls turning their head head on one side, when desirous of more closely examining some object which has attracted their attention. When excited by the presence of a strange object chickens will often be noticed examining it, first with one eye and then the other, turning their heads for that purpose, thus showing that they cannot bring both eyes to bear upon it at once. The only exception to the general rule is found in the case of the owl whose eyes are placed in front of the head, and are capable of being brought to a focus on an object at a very short distance in front.

AT the Agricultural Experiment Station of Maine State College, observations covering the period of growth of four years have shown that the excess of moisture in forest above that of open fields averages 10 per cent, reaching 14 per cent in the middle of the day. The excess would undoubtedly be greater in a very dense forest, The presence of patches of forest in any region exerts a marked influence on the hygroscopic conditions of the atmosphere, and this con-

dition, in turn, is an important factor in the growth of vegetation.

A new forage plant—*Polygonium Saghaliae*—is being tried at Alliers, France. It requires little care, grows to a height of six feet in three or four weeks, and its large leaves are readily eaten by cattle. A second growth quickly follows the first cutting. A single plant covers more than a square yard, and yields over 80 pounds of leaves. The plant is a native of the island of Saghalien, Japan.

THE best existing map of the moon shows 32,856 craters-shaped projections according to M. Wilhelm Meyer, and astronomers tell us that a hundred thousand are brought into view with a telescope of medium power. It is not probable that these so-called craters have all been eruptive volcanoes, for the size of some of them is opposed to this assumption no less than their great number. The crater Copernicus, perhaps the most beautiful of all, is a circular wall about 54 miles in diameter. rising in one place almost perpendicularly to 13,000 feet, Its origin has not been satisfactorily explained. On the other hand, the systems of radiations about the crater Tycho, covering half the moon's surface, may well be regarded as the effect of the cooling and contraction of the moon from a molten state.

THE shell-fish of France are found by M. Locard to include 1500 marine and 1250 land and fresh-water species. In England there are only 550 marine and 150 land and fresh-water forms.

GOOD authority assures us that the formic acid present in ants imparts to these creatures a not unpleasant taste. One entomologist in his boyhood prepared a mixture of crushed ants with sugar and water, which was relished by his companions as a substitute for lemonade and a correspondent of *Insect Life* mentions a man who is in the habit of eating large black ants obtained from rotten wood, while another man noticed an agreeable acid flavor in a piece of pie eaten in the dark which subsequently proved to have been swarming with little red ants.

THE influence of electricity on vegetation has been a subject of experiment by Prof Chodat and others, of Geneva, during the last two years. In one test a quantity of beans was divided into two lots, planted in vessels of sawdust, and exposed to exactly similar conditions of moisture, warmth and light. But one vessel was put under electrical influence from forty minutes a day at first to three or four hours a day a little later. The electrified lot showed leaves on the fourth day, when no signs of them were apparent in the other lot, and the difference was increased on the fifth sixth and seventh days, when the electrified plants had reached considerable size while the others were just starting, The stems and roots were much more vigourous in the electrified lot. The experiment confirmed the opinion that electricity promotes development and growth in length; but in ultimate development of leaves the non-electrified plants proved the superior.

PHYSICISTS insist that the world cannot be more than 20,000,000 or 30,000,000 years old. Most geologists claim that its age is much greater, the calculations of geological time varying from a minimum of 3,000,000 years to a maximum of 1,200,000 years. In his American Association paper the other day, Prof. C. D. Walcott estimated from the depth of the sedimentary rocks that 45,140,000 years have elapsed since Archean time, no attempt being made to fix the duration of the latter period. He believes that the main outlines of the North American continent were laid down as far back as Archean time.

Metereological Report.

Lat. 35° 55′ N. Long. 14° 29′ E.

Barometer Readings reduced to 32° F. at sea level.

ST. IGNATIUS' COLLEGE
MALTA.
1893.

Results of observations taken during the months of	August		Average 10 years	Septem.	Average 10 years
Mean Reading of Barometer	inches	30·023	30·010	30·044	30.064
Highest „ „ on the 13th	„	30·136	30·156	30·243	30·246
Lowest „ „ on the 31st	„	29·775	29·863	29·869	29·849
Range of Barometer Readings		0·361	0·293	0·374	0·397
Highest Reading of Max: Therm: on the 18th ...		95·1°	97·0°	98·8°	92·2°
Lowest Reading of Min: Therm: on the 22nd ...		66·2°	66·2°	66·5°	62·9°
Range of Thermometer Readings		28·9°	30·8°	32·3°	29·3°
Greatest Range in 24 hours on the 22nd		23·6°	26·2°	22·2°	23·0°
Mean of all the highest Readings		86·9°	87·3°	87·8°	82·6°
Mean of all the lowest Readings		70·1°	71·1°	72·3°	68·5°
Mean Daily Range		16·8°	16·2°	15·5°	14·1°
Mean Temperature (deduced from Max: and Min.)		77·7°	78·4°	79·1°	74·7°
Mean Temperature (deduced from Dry Bulb.) ...		77·7°	78·4°	77·6°	74·5°
Adopted Mean Temperature		77·7°	78·4°	78·4°	74·6°
Mean Temperature of Evaporation		71·8°	71·4°	71·7°	68·9°
Mean Temperature of Dew point		67·5°	66·7°	67·5°	64·8°
Mean Elastic force of Vapour	inches	0·673	0·653	0·673	0·615
Mean Weight of Vapour in a cubic foot of air ...	grains	7.2	7·0	7·1	6·7
Mean additional weight required for saturation...	„	3.0	3·5	3·3	2·6
Mean degree of Humidity		71	67	68	72
Mean Weight of a cubic foot of air	grains	512·5	512·2	570·2	517·3
Fall of Rain	inches	0·030	—	—	1·375
Number of days on which Rain fell		1	—	—	5
Mean amount of Cloud (an overcast sky = 10) ...		1·4	1·0	2·0	2·4
Total number of miles of Wind indicated ...		4474	5442	5817	5630
Mean Velocity of Wind per hour...	miles	6·0	7·3	8·1	7·8

REMARKS.

August.

Dew Point: ranged between 59·7° on the 1st and 74·0° on the 29th.
In Sunshine: the highest reading was 148·8° on the 31st.
On Ground: the lowest reading was 60·8° on the 11th.
Lightning was seen on the 6th.
Total Rainfall since last June 0 inches; the average of 10 years, 0 inches.

(Signed) James Scoles, S. J.

September

Dew Point: ranged between 75·8° on the 20th at 8. a.m. and 51·6° on the 25th.
In Sunshine: the highest reading was 147·9° on the 20th.
On Ground: the lowest reading was 60·0° on the 6th.
Total Rainfall since last June. 0·30 inches; on Aug. 6th the average of 10 years, 1·524 inches.
The hottest month of this year, and hotter than any previous Sept. of last ten years. Total absence of rain never before recorded during last ten years. High dew-point made the weather very oppressive.

(Signed). J. F. Dobson, S. J.

CHESS.

"Labor et constantia"

All communications connected with this column to be addressed to the editor of the Chess Column, 48, Strada Mercanti.

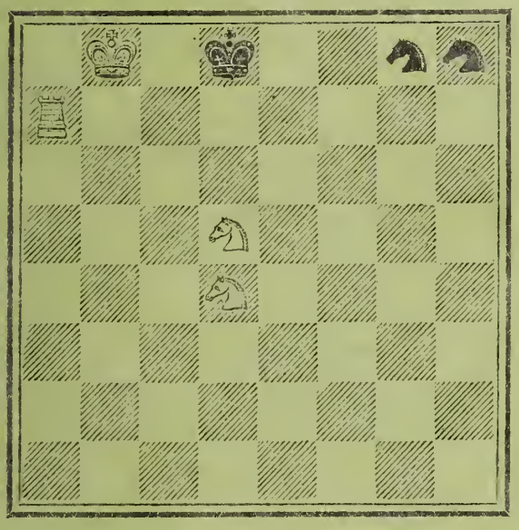
SOLUTION OF PROBLEM No. 1.

White.	Black.
1. R to B 5	Any
2. Mate accordingly.	

PROBLEM No. 2.

By C. Fiaschi, Ferrara.

Black.



White.

White to play and mate in three moves.

Current Gossip. A match is announced between Dr. S. Tarrasch and M. J. Tschigorin, Steinitz's great opponet. The first winner of 10 games scores the match, which will be played at St. Petersburg. Stake of £ 250 a-side is mentioned.

Lasker in his challenge against Steinitz, accepts that stakes may be $ 3000—and that play commence not later then January 1st next.

Prizes are offered for the best set of rules for playing the game of Chess by the editors of the *Chess Player's Annual*, to be published by the British Chess Company (247 High Holbonn). Among the recent issues by the same firm the following are mentioned: *Six practical Chess Openings*, *Index to the Chess Openings*, and *Six Chess Lessons for Junior Players* S. Tinsley.

These according to the *Times* "contain all that the beginner wants to know—or the more advanced student for that matter is told in a concise way."

GAMES.

Off-hand Play.—The following game (Vienna opening) was played recently in the New York, Schottländer (White), and Rocamola (Black):—

White.	Black.
1 P—K 4	P—K 4
2 Kt—Q B 3	B—B 4
3 P—K B 4	P—Q 3
4 Kt—B 3	Kt—K B 3
5 B—B 4	Kt—B 3
6 P—Q 3	P—Q R 3
7 Kt—Q 5	B—K 3
8 P—R 3	R—R 2
9 B—Kt 3	Castles
10 P—B 5	B × Kt
11 P × B	Kt—K 2
12 Kt—B 4	Kt—(K 2) × P
13 Q—B 3	P—K 5
14 P × P	R—K sq
15 B—B 2	Kt × K P and wins (a)

(a) A pretty finish. If B × Kt. Q × Kt ch, and wins a piece.

We may fittingly place together with the above a curious little game (Centre Gambit) played recently in a match at Leeds between Messrs. F. P. Wildman (White) and J. S. West (Black).

White.	Black.
1 P—K 4	P—K 4
2 P—Q 4	P × P
3 Q × P	Kt—Q B 3
4 Q—K 3	Kt—K B 3
5 B—Q 2	B—K 2
6 B—K 2	P—Q 4
7 P—K 5	Kt—K 5
8 P—K B 4 (a)	B—B 4
9 Q—Q Kt 3	Q—R 5 ch
10 P—Kt 3	B—B 7 ch
11 K—B sq (b)	

Black mates in two moves.

(a) This was White's mistake. He was evidently anxious to save the K P and overlooked Black's most obvious next move.

(b) He should have played K—Q sq., but the game was lost, as White can proceed with B × P.

(From *The Times Chess Column.*)

An Australian Brilliant, the White being played by Mr. Legall.

White.	Black.
1 P to K 4	1 P to K 4
2 B to B 4	2 P to Q 3
3 K Kt to B 3	3 Q Kt to B 3
4 Kt to B 3	4 B to Kt 5
5 Kt takes P	5 B takes Q

White mates in two moves.

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„ „ Brindisi	„ 17	„ 10	„ 25	„ 16
„ „ Alexandria	„ 20	„ 12	„ 32	„ 20
„ „ Port Said	„ 21	„ 13	„ 34	„ 21
„ „ Ismailia	„ 22	„ 14	„ 35	„ 22
Malta to Brindisi and Alexandria ...	„ 10	„ 7	„ 18	„ 12
„ „ Port Said	„ 11	„ 9	„ 19	„ 14
„ „ Ismailia	„ 12	„ 10	„ 20	„ 15
Naples to Malta	„ 4	„ 3	—	—
„ „ Alexandria	„ 11	„ 9	„ 19	„ 14
„ „ Port Said	„ 11	„ 9	„ 19	„ 14
„ „ Ismailia	„ 12	„ 10	„ 20	„ 15
Genoa to Malta	„ 6	„ 4	—	—
„ „ Alexandria	„ 12	„ 9. 10	„ 21	„ 15. 10.
Gibraltar to Malta	„ 8	„ 5	—	—

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The Mediterranean Naturalist.

Contents-August.

		PAGE
1	Wanted—A museum for Malta	387
2	Artificially coloured flowers	389
3	Petroleum Theories	389
4	Resoconto di una escursione fatta alle grotte di Isoverde in Liguria da Emilio Balbi ed A. Caruana Gatt	389
5	On Fuligula rufina in Malta—N. Tagliaferro	391
6	City Dust	392
7	La Botanique du Nord Etbai—E. A. Floyer	392
8	The Orange Disease in Cape Colony—S. D. Bairstow, F.L.S.	394
9	Colours of Ancient Egypt	399
10	A Modern Golgotha—Minnie Cooke	400
11	The Collection and preparation of foraminifera—E. Halkyard, F.R.M.S.	401
12	Deep Sea Exploration in the Eastern Mediterranean	402
13	On the Occurrence of Concretionary masses of Flint & Chert in the Maltese Limestones. J. H. Cooke	403
14	*Notes and News.*	405
15	Maltese Meteorology	410

Contents-October.

		PAGE
1	The Utilization of the Waste Lands of Malta—John H. Cooke	411
2	Plant Extremes	414
3	Egyptian Horses	415
4	Notes sur la géologie de l'Etbai nord ou désert Est égyptien—E. O. Floyer	415
5	The Mystery of the Moon	417
6	Local Notes—A. C.G.	418
7	Starlings—A. Walker	419
8	On the Occurrence of Echeneis Naucrates in Maltese Waters—Prof. N. Tagliaferro	421
9	A Novel Industry	421
10	Sui Limacidi dell'Algeria—Prof. C. Pollonera	422
11	Method of taking plaster casts of Natural History Objects	425
12	The Orange Disease in Cape Colony—S. D. Bairstow F. L.S.	425
13	Hints for Young Collectors	428
14	*Notes and News*:—Capture of a Sea-Cow—Orange disease in China—Discovery of Phœnician remains in Malta—Maltese agricultural methods—Disease of the olive tree. Egypt's date palms—Reptilian fauna of Malta—Tapeworm statistics—Malta bees and their work—Locust-egg oil—An antiquarian's opinions—etc. etc. etc.	429
15	Maltese Meteorology	434

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CONTENTS.

		Page
1	The Tapestries of St. John Church, Valletta	435
2	On the Orange Fly in Malta—A.C.G.	438
3	Recent Exploration of the Maltese and Sicilian Caves	438
4	Stray notes on the Natural History of Spain—W.C. Hey	440
5	Vestiges of the Phœnicians in Malta—John H. Cooke	441
6	Stray Thoughts	446
7	Common Beetles of the Maltese Islands—Dr. A. Caruana Gatto	447
8	The Victoria Cavern, Malta—John H. Cooke	451
9	The Orange Disease in Cape Colony—S. D. Bairstow F. L. S.	453
10	The Utilization of the Waste Lands of Malta—John H. Cooke	455
11	*Notes and News:*—Our thanks:—*Natural Science.*—The *limans* of Odessa	458
12	Advertisement	458

NOTICES.

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The Tapestries of St. John's Church Valletta.

The Cathedrals and collegiate churches and chapels of Great Britain can boast of almost endless variety of splendid decoration in each of the numerous materials capable of being adapted to purposes of ornament, stone, marble, and wood in every pattern of carving, every arrangement of colour; metal, bright and dull; precious bullion and simple artistically-fashioned iron; glass, glowing with the hues of all the fruits of Aladdin's cave; and frescos or mosaics symmetrically arranged and artistically coloured: but save by a few conventional hangings and frontals, or here and there a heraldic banner, the art of the artificer with the needle of the loom is very sparingly represented in ecclesiastical adornment. In one or two of the old engravings of royal ceremonials in Westminster Abbey we do indeed find indications of hangings adorned with pictorial art, probably intended as a representation of tapestry; but there is every reason to believe that these were lent for the occasion, and merely used as temporary screens or partitions to ensure for the nonce a more convenient arrangement of space.

On the other hand the art of the *tapissier* has been quite as often employed throughout the continent of Europe on sacred subjects as on secular. Many of the great churches abroad are known to possess very fine sets of the material which at first denominated Aerces from the place of its manufacture, came to be more generally styled tapestry when Brussels (after the taking of the former town by Louis XI) established itself as the principal seat of the art, a distinction which it long retained in spite of the rivalry of the factories established in France, in Italy, and in England. There are, for instance, it is safe to assert, no finer specimens of the textile art than the *arrazzi* or hangings still preserved in a British dependency, the island of Malta, belonging to the conventual church of

St. John to which they were presented in the year 1700-1, by Raymond Perellose Roccaful, Grand Master of the Order of the Knights Hospitallers, of which a brief monograph has recently been issued from the Government Press of the Island, and the pen of Sir F. V. Inglott G. C. M. G.

They were executed in Brussels, probably at the factory, and certainly under the inspection of Judocus de Vos, one of the most eminent Flemish manufacturers, and bear with his name the well known mark of the Brussels loom, an escutcheon gales, between two capital letters B. Historical evidence points to the fact that the whole of these grand achievements of the weaver's art, twenty-nine in number, were executed between the years 1697 and 1700; and M. Darcel director of the Gobelin's factory observed on the occasion of his visit to Malta in 1881, "we are astonished that three years should suffice to weave so large a surface"—The skilled eye of expert however did not fail to discover that the degree of speed had been attained by a division of labour not often traceable in ancient specimens, resulting in some patent defects, for inasmuch as the large subject pictures seem to have been fabricated in one piece, and then joined to two perpendicular and two horizontal borders, forming a frame surrounding each of them the junction of this frame at the angles presents in several instances a want of accuracy which even the inartistic eye is competent to detect. Here and there also, especially in the portions executed in grisaille, (grey shading) a break in a shadow brings a light coloured fold of the drapery into the continuation of the dark one. M. Darcel attributes this disfiguring blunder to the simultaneous employment of several work people upon the same piece, and the fact that from not strictly observing the line of general proportion one has missed the true point of junction at which his work should have combined with the other; a mistake all the more likely to occur, when as we are informed was the practice, apprentices were employed to weave the easier and less elaborate portions of the design, while those of a finer and more ornamental character were under the charge of experienced artificers, known as "*officiers de tête.*"

M. Darcel ingeniously describes tapestry as a "woollen mosaic" the art in the one lying in the arrangement of the threads of wool, as in the other of the coloured cubes of marble which constitute the material with which the design is carried out; there is however this drawback to the beauty and permanency of the textile material, that when suspended from an arch or along a wall, the weight is borne by the threads of the woof and not by the substance or warp of the tapestry; hence the fabric is liable to speedy disintegration, and requires to be lined, and to be furnished with a contrivance for a more even distribution of the strain upon it, by way of precaution against the injury which is sure to result when it is merely suspended from the upper edge without these safeguards. The Malta tapestries have never until the present decade been protected from this mischief, and hence fell into disrepair, which might soon have destroyed them but has fortunately been arrested without material injury to their general effect.

For size and beauty, as well as for adaptation to the position which these pictures are intended to adorn, this superb set of tapestries excels any other in existence. The fifteen large panels, 20 × 22 feet each, which contain the scriptural and devotional designs, cover a space of more than 571 French metres: the panels in grisaille more than 122 metres, being fourteen in number, and measuring each 6 × 22 feet. To appreciate them properly we must glance at the general plan of their display, arranged there can be little doubt by the donor under the advice of the eminent artist Matteo Preti, the painter of the grand romantic ceiling of St. John's, whose death took place in the year preceding that which is the date of the gift of the Tapestry.

The church of St. John is in plan simply an oblong vault 187 feet by 118; a wide central nave, of 50 feet span, lighted by pierced openings in the barrel of the roof, 63 feet in height, is flanked on either side by six chapels of similar design, which again have arches of communication one with another so as to form side aisles parallel to the choir and nave. Every inch of the walls of these and of the massive piers which sustain the fabric and separate the chapels from each other, is lavishly and gorgeously adorned by the art of the carver, gilder, and painter. The ceiling glows with the tints of the pencil of Il Calabrese (Preti), and the pavement is entirely composed of a most elaborate mosaic of coloured marbles, wrought into the coats of

arms, crests, and other heraldic and symbolical insignia of upwards of 400 knights of the order.

It was for this superbly decorated church, on which the gold of his predecessors had been so profusely lavished, that the Grand Master Perellos destined his gift, the *Gioja* or *Bijon* which he was bound by the statutes to present on his election, which the antecedents of the sanctuary, and his own reputation for wealth and generosity alike, made it necessary should be a splendid one. Over the main entrance, at the west end of the church, he placed his own portrait, copied from a picture by Preti, in which he is represented as accompanied by St. Michael (or as others say a figure of Victory in armour) and by an angel distributing alms to the poor representing Charity. On either hand, and across the arches which give entrance to the chapels, are hung seven large tableaux from designs which, with two exceptions, bear unmistakeable marks of the genius of the great painter Rubens. These fifteen pieces are each surrounded by borders woven in imitation of carved and gilded wood work, with the shield of arms of the donor, three pears, quartered by the cross of the order, and to give additional height, an entablature with medallions and garlands of fruit executed in imitation of a sculptured balustrade is superimposed. The subjects of these tapestries from west to east are as follows, The Annunciation, The Four Evangelists, with their respective symbols, The Nativity, The Adoration of the Magi, The Entry into Jerusalem, The last Supper, The Crucifixion, The Resurrection, The Institution of the Feast of Corpus Christi, The Triumph of the Catholic Church, The Triumph of Faith, Time unveiling Truth, and the Destruction of Idolatry. These possess in a high degree the characteristics of the vigorous outline and powerful colouring of the great painter of Holland, indeed the Calvary is a Copy of his well known Antwerp picture, and the originals of several others are in the Louvre and at Madrid, while the Corpus Domini (interesting as containing a portrait of Pope Urban IV.) has a great resemblance to Raphael's picture at the Vatican known as *La Disputa del Sagramento*. Two of the designs however are clearly not from the pencil of Rubens, and are supposed to be from the easel of Nicholas Poussin, these are the Entry into Jerusalem and the Last Supper, the second of which with its true classical arrangement of the figures upon the *triclinium* is one of the most beautiful of the series, and one of the best representations of the solemn event which it pourtrays.

The narrow pieces in grisaille, which represent our Lord, the Blessed Virgin, and twelve apostles arranged in the order in which they are mentioned in the canon of the Mass, are hung between the subject pictures, covering the faces of the six pillars between the chapels, and completing the ensemble. It has been remarked that these figures are some of them inelegant and out of drawing, but allowance must be made for the fact that they are intended to be viewed from beneath, and appear foreshortened. Below each of these also is an elegant trophy of arms and banners surrounding the escutcheon of the Bâli Perellos, and the entablature which surmounts the large tapestries is continued throughout.

Unfortunately the magnificent coupd'œil which the church presents when adorned with these priceless works of art is only visible to the Englishman detained by duty, or who chances to be a passer by the island of Malta, in the blazing month of June: during the rest of the year the tapestries are kept in the seclusion of some vault or corridor, and only by chance, when repairs are needed to some particular tableau, has the most favoured visitor a chance of seeing them. About ten years ago the condition to which they had been reduced by nigh two centuries of neglect imperatively demanded repair, and it was a question whether that repair was being properly executed which brought M: Parcel out to Malta, and procured us the advantage of his scientific and intelligent criticisms. But although the Government wisely expended a sum of almost £ 3000 on their restoration, and a native official recommended their future safekeeping in such a position that they would be accessible to the general public, without exposing them to danger of any injury to their colours or texture or any limitation of their use as church ornaments, they are still allowed to be secluded as an appanage to an ecclesiastical corporation, whose guardianship in the past has not been such as to inspire much hope that it will be more favourable to the lovers of art than that of some other dignitaries nearer home has been known to be in similar circumstances.

Surely it might be possible at some of those festivals of the church which occur in the winter season, to substitute these noble and beautiful works of art for the uninteresting crimson taffeta which incongruously destroys the effect of the stately sanctuary of the knights. The admiration which the more modern "Tenture des Indes" presented by the same magnificent benefactor Perellos, in 1720, to the palace of the Grand Master, always excites, is an additional reason why connisseurs should be able to compare these master pieces of the Govelius loom, the work of Le Blond, with the productions of the equally famous *tapissier* of Brussels. There is quite sufficient artistic feeling among the educated classes of Valletta to appreciate the advantages of such an opportunity, and we hope that pressure may brought to bear upon their custodians in the direction indicated by Sir. F. Inglott that these treasures of art may be redeemed from the oblivion in which they at present lie.

W. K. R. B.

On the Orange Fly in Malta.

"Id-dubbiena tal laring" is the title of an interesting pamphlet in the Maltese dialect on the Orange Fly which has been just been published by Prof. N. Tagliaferro at the expense of the Agricultural Society. It has been largely distributed among fruit growers in the country districts.

The author first gives a popular exposition of the life and habits of the insect in a clear and concise style, in the course of which he strongly insists on the necessity of the gathering of all rotten fruits that have fallen to the ground in order to prevent the grub from entering the soil and undergoing therein its metamorphosis into a pupa. He alludes to the part which the red-breast *(pettiross)* plays in reducing the numbers of this pest during the three or four months of its stay in the Island in winter, when it destroys great numbers of this fly; and he expresses an opinion that the life of this useful bird together with that of other insectivorous birds should be protected by local law.

As a means of diminishing considerably the damage caused by the orange fly all through the Island the author suggests a device of his own by means of which he appears to have succeeded in actually destroying in October last all the flies which infested the orange trees in his garden at Musta. Having smeared with a little honey some oranges in each of the two trees, which being sheltered in a nook of the garden were first infested, Prof. Tagliaferro observed that the flies quickly gathered round the honey and seemed to appreciate that treat so highly as to let themselves be struck by the hand without making any effort to escape.

He succeeded also in killing hundreds of flies with the greatest facility by making use of the sticking paper known as "Fly cemetery". If half a sheet of this paper be kept in one's hand, the sluggish fly is easily struck and if it tries to escape it sticks to the paper and is soon killed.

We think that Prof. Tagliaferro's suggestions, which are very practical, should be given a fair trial by all those who take interest in the subject of fruit growing, more particularly in the important industry of Malta oranges which is one of the chief exports of these islands.

A. C. G.

Recent Explorations of the Maltese and Sicilian Caverns.

Some interesting progress has recently been made in investigating the bone-caves of Malta of Sicily. It has long been a matter of common belief that these islands are the remmants of one of the old land barriers connecting Europe with Northern Africa during at least part of the Pliocene and Pleistocene periods; and a detailed study of the animal remains met with in the fissures and caverns is thus one of the foremost importance. Not only is it possible to recognise the mingling of northern and southern animals, and the apparent effect of isolation upon them before their complete extinction as the feeding-area became more and more reduced by subsidence; but it also seems likely that some idea of the nature of recent physical changes in the region in question can be obtained from a comparison of the sequence of deposits in the various localities examined. The work in Malta has been carried on by Mr. John H. Cooke, with the aid of a grant from the Royal Society of

London (7); the new researches in Sicily are those of Dr. Hans Pohlig, based upon a large collection of bones in the Palermo Museum from the Cavern of Pontale, at Carini (10).

The bone-caves of Malta were discovered so long ago as the middle of the seventeenth century (1), and they have long been wellknown through the explorations and researches of the late Rear-Admiral Spratt (11), Professor Leith Adams (2-5), Dr. Hugh Falconer (8), and Dr. George Busk (6). They have yielded some dwarf elephants, described under the names of *Elephas melitensis*, *E. falconeri*, and *E. mnaidriensis*, and a dwarf hippopotamus *(H. pentlandi)*. They have also furnished evidence of a so-called gigantic dormouse (*Myoxus melitensis*), some large land-tortoises (3,4), and various birds (9). Mr. Cooke's researches, therefore, are for the most part only an independent verification of results already obtained; but, at the same time, he has succeeded in making one or two striking additions to our knowledge of the extinct fauna in question. The principal specimens obtained have been placed in the British Museum, and a detailed report on these fossils by Mr. A. S. Woodwards is appended to Mr. Cooke's account of his results.

Attention has been chiefly confined to one cavern in the Har Dalam Gorge, near Marsa Scirocco Bay, where Spratt and Adams accomplished so much. It is situated 500 yards from the shore, and its mouth is now 40 ft. above the small stream which, in rainy weather, flows through the gorge. There is evidence everywhere of former torrential rains, where all in now comparatively parched; and Mr. Cooke considers that no other phenomenon could have filled the caves and fissures as he find them. In most parts the Har Dalam Cave was filled to a height of within 2 ft. of the roof, and one of the principal sections of the contents showed the following succession of layers:—(i.) Unstratified surface *débris*, 6 in.; (ii.) Red clayey loam, 3 ft., with *Hippopotamus*, *Cervus*, and pottery; (iii.) Unfossiliferous black earth, 4 in.; (iv.) Dark red plastic clay, 1 ft. 6 in., with *Hippopotamus*; (v.) Reddish clay, 1 ft. with *Hippopotamus* and *Cervus*; (vi.) Unfossiliferous yellow plastic clay, 2 ft. In one place a human bone was found at about the base of layer iii.; and layer v. also yielded the first evidence of extinct carnivorous animals discovered in Malta—a portion of mandible with teeth of a bear, and one tooth of a canine quadruped as large as a wolf.

The discovery of these carnivora in the Maltese caverns is of great interest, because gnawed bones have already been noticed; but it is probable that still others remain to be found, notably the lion and hyæna. The jaw of the bear, moreover, cannot be specifically determined—cannot be definitely assigned either to any extinct animal, to the brown bear, the grisly, or to those of Northern Africa; can only be distinguished with certainty from our cave bear. As for the canine, a single tooth is insufficient to prove whether or not it belongs to a domestic dog.

Still more interesting is the discovery of a great number of bones of a small deer, mostly identified with the diminutive race of the common stag met with in Northern Africa and known as the Barbary Deer. The Fallow Deer may also have been present, but there are no characteristic frag-

(1) Abela.—*Della descrittione di Malta, 1647.*

(2) Adams, A. L.—*Natural History and Archæology of the Nile Valley and Maltese Islands, 1870.*

(3) ————.—*On fossil Chelonians from the Ossiferous Caves and Fissures of Malta.* Quart. Journ. Geol. Soc., *vol. XXII, 1866.*

(4) ————.—*On Gigantic Land-Tortoises and a small Fresh-water Species from the Ossiferous Caverns of Malta.* Ibid., *vol. XXXIII, 1887.*

(5) ————.—*On the dentition and Osteology of the Maltese Fossil Elephants, being a Description of Remains discovered by the Author in Malta between the years 1860 and 1866.* Trans. Zool. Soc. *vol. IX, 1874.*

(6) Busk, G.—*Description of the Remains of three extinct Species of Elephant, collected by Captain Spratt, C.B., R.N., in the Ossiferous Cavern of Zebbug, in the Island of Malta* Trans. Zool. Soc., *vol. VI, 1867.*

(7) Cooke, J. H.—*The Har Dalam Cavern, Malta, and its Fossiliferous Contents, with a Report on the Organic Remains, by A. S. Woodward.* Proc. Roy. Soc., *1893.*

(8) Falconer, H.—*Palæontological Memoirs, edited by Murchison.*

(9) Parker W, K—*On some fossil Birds from the Zebbug Cave Malta.* Trans. Zool. Soc., *vol. VI, 1167.*

(10) Pohlig, H.—*Eine Elephantenhöhle Siciliens und der erste Nachweis des Cranialdomes von* Elephas antiquus. Abhandl. k. bay. Akad. math.-phys. Cl., *vol. XVIII, 1893.*

(11) Spratt, T. A. B.—*On the bone-caves near Crendi, Zebbug, and Melliha, in the Island of Malta.* Quart. Journ. Geol. Soc., *vol. XXIII, 1867.*

ments. One superficial layer in the Har Dalam cave consisted almost entirely of these remains in stalagmite, belonging to animals in all stages of growth, perhaps even from the unborn fœtus onwards. The adults vary much in size, but the largest complete antler measures only about 12 feet in length.

It is worthy of notice, in reference to Dr. Pohlig's recent memoir on the Cave of Carini, that the same form of dwarf deer is also now recognised in Sicily. Dr. Pohlig, however, gives a new sub-specific name to the animal, terming it *Cervus (elaphus) siciliæ;* and his nomenclature for the associated species is not altogether such as will commend itself to many zoologists.

The chief advance made by Dr. Pohlig, indeed consists in his adding to the known Pleistocene fauna of the Sicilian area this small deer and the dwarf elephant commonly known as *Elephas melitensis.* Of the latter, even finer specimens have been discovered at Carini than those obtained from Malta; and Dr. Pohlig is now able to describe the whole skull for the first time. As the result, he is more than ever convinced of the correctness of his opinion, expressed some years ago, that all the dwarf Maltese elephants described by Falconer, Busk, and Adams are merely a stunted race of the typically European *Elephas antiquus.* He even goes further, and concludes that the latter elephant wandered in Pleistocene times as far south as India, being represented in the Narbada Valley by the so-called *E. namadicus.*

Besides the bones of animals in the new Sicilian cave, which are now described as including remains of such familiar European species as *Bos primigenius* and *Bison priscus*, there are also some traces of man, in the form of rude pottery and stone implements. There is, however, no very clear evidence as yet to indicate man's relationship to the extinct fauna; and we refrain from quoting Dr. Pohlig's table of the succession of episodes supposed to be proved by the series of deposits he has examined. All these new facts will some day be of great service when the time for broad generalisations as to the recent changes of land and sea in the Mediterranean area is at hand; at present it seems futile to base speculations on isolated phenomena.

"Natural Science" Dec. 1893.

Stray Notes on the Natural History of Spain.

I spent two weeks in Spain in the Spring of the year 1882, and though I did not undertake the journey with the express object of studying Natural History, still whenever I could spare a few hours from sight-seeing, I devoted them to collecting. My attention was chiefly given to coleoptera and mollusca. The first place at which I stayed a day was Burgos. Here I fished some stagnant ditches, and obtained *Colymbetes fuscus*, *Agabus bipustulatus*, *Hydroporus depressus*, *H. halensis* and *Dytiscus marginalis*, the smooth backed form of the female being more numerous than the normal form. These ditches yielded a few fresh-water shells, viz. *Limnæa peregra*, *L. palustris* and *Planorbis vortex.* The castle hill swarmed with *Helix caspitum*, and under stones I took *Brachinus sclopeta*, *Harpalus æneus*, *H. caspius*, and a *Zabrus.*

I next stayed at Cordova, where *Helix lactea* was the most conspicuous snail. By the river side, *Cartallum ebulinum* abounded, and the pretty *Chrysomela paludosa* also occurred. Under a stone in a damp spot, I found a fine batch of *Chlænius velutinus*, keeping company with a family of young snakes. The emerald coloured *Hoplia farinosa* was very common here.

At Granada the most conspicuous beetles were the white-coated *Asidas—(A. Ramburi)* which were crawling on the dry hill sides among the cistus bushes. In the cistus blooms, *Tropinota hirtella* abounded. On the shingle by the River Darro were running many *Paederi* with the thorax only red—so I set them down as P. *ruficollis*, Fabr. *Chrysomela Banksii* was common and the rich coloured *C. Americana*, *Akis acuminatus* and a species of *Tentyria* swarmed about the roads and streets—I also met with *Steropus globosus*, *Cicindela campestris* and a very large species of *Lixus.*

Waiting an hour at Utrera junction, I examined some umbelliferous plants, and found the blooms attracting large numbers of the scarlet *Trichodes spunctatus* as well as *Cistela ruficollis.*

At Seville, the dung in pastures by the Guadalquivir was full of the black *Onthophagus tages* and large Scarabaei, of which I identified *Onitis*

Olivieri and *Bubas Bison.* The river banks yielded *Pœcilus quadricollis.* Of mollusca I collected *Unio littoralis*, and a species of *Melania* and *Melanopsis.*

At Cadiz, the dumpy *Pimelia obesa* met one every where, crawling slowly over the dry ground. The large *Ateuchi*, *A. Sacer* and *A. cicatricosus*, were conspicuons among the saud, rolling their pellets of dung. The rocks at low water yielded a live Bulla (B. Striata, I thinks in great number. From Cadiz, I made a short excursion to San Fernando.The sandhills here were beautified with a grand species of *Limonium*, and a very elegant *Solanum* with handsome yellow fruit. *Scarites Polyphemus* very abundant here, displaying its very formidable mandibles, and I met with a single specimen of *Carabus Dufouri.* Whenever I stopped in Andalusia, I found *Helix Pisana* to be far the commonest snail, often adhering to the Agaves in great numbers—The weather however was far too dry to be favourable to the conchologist and the results were disappointing.

West Ayton. York.

W. C. Hey.

Vestiges of the Phœnicians in the Maltese Islands.

It is truly surprising how scant is the knowledge of the early history of the Maltese Islands which is possessed by a large majority of the thousands who annually visit these shores. People come, and even though they tarry months and ofttimes years in the island, they seldom carry away with them any but the vaguest ideas of the really thrilling and romantic history that the islands possess; or ever appreciate the fact that, insignificant though the islands are in comparison with the land masses around them, they have yet served as the theatre in which some of the most thrilling events of ancient and medœval times have been enacted. Malta has shared alike in the viscissitudes of the Roman, Greek, and Carthaginian empires; and it has assisted, to a no insignificant extent in swaying the destinies of those erstwhile mistresses of the world. It has been ravaged by the Vandals and Goths, and subjugated by the fanatics of Islamism; and finally, as the headquarters of those champions of Christendom, the Knights of St. John, it attained the proud position of being acknowledged as one of the first of the maritime powers of Europe.

There are, at the present time, no evidences to show who the aboriginal inhabitants of the islands were, though some light has recently been thrown on this phase of the subject by the very interesting discoveries of the remains of a primitive people in the Har Dalam Cavern at the eastern extremity of Malta.

The earliest written records that we possess are those which are contained in the chronicles of Diodorus Siculus. (Libro VI.) To this historian we are indebted for much valuable information bearing on the early history of the Mediterranean regions, in the course of which he details the circumstances under which the islands were first colonized.

"Malta," he tells us, "was a great centre of civilization, long before the foundation of Rome. It is furnished with many and very good harbours and the inhabitants are very rich, for it is full of all sorts of artificers, among whom there are excellent weavers of fine linen. Their houses are very stately and beautiful, adorned with graceful eaves, and covered with white plaster. The inhabitants are a colony of Phœnicians, who trading as merchants, as far as the western coasts, resorted to this place on account of its commodious ports, and convenient situation for maritime commerce; and by the advantages of this place, the inhabitants frequently became famous both for their wealth, and for their merchandise."

The Phœnicians were the first great colonizers of the Mediterranean; and as early as 2000 B. C. their influence was felt from the banks of the Euphrates and Tyre and Sidon in the East, to the Pillars of Heracles aud the British Cassiterides in the west. They planted colonies, and founded large towns in Africa and Sicily; and we can therefore well understand that an island so centrally situated as Malta was, and one so admirably adapted for direct intercourse with the Carthaginians, Greeks, and Etruscans of the surrounding colonies, should have been regarded as being a very desirable acquisition totheir Mediterranean

possessions. Diodorus tells us that the island was, taken possession of by the Phœnicians about 1519 B. C., and that it was occupied by them till 750. B. C. a period of 650 years, during which it was utilized both as one of their principal maritime and trading depots, and as one of the chief centres for the celebration of the rites of the Phœnician religion.

Relics of this period are not wanting to bear out the assertions made by the ancient historiographer, relics which, notwithstanding their time-worn condition, and the obscurity in which their origin is involved, powerfully appeal both to the imagination as well as to the curiosity of the man of antiquarian tastes.

Of late years, this interesting phase of the islands history has been taken up with considerable zeal, and the labour bestowed has resulted in the clearing away of many of the crude speculations, and superstitious fancies in which the Phœnico-Maltese remains had previously been invested.

Of the evidences of Phœnician occupation still existing in the islands, the most interesting, both in regard to size and complexity of details, are the megalithic temples in which the Phœnicians performed their religious ceremonial rites. Two of these, *Hagiar Chem* and *Mnaidra*, are situated within a short distance of one another near the southern cliffs of Malta, on an ancient shore terrace which overlooks the Mediterranean. The name *Hagiar Chem* is a corrupted Phœnician expression signifying "stones of veneration." The general outline of the structure is that of a horse-shoe, around the periphery of which are seven elliptical or egg-shaped courts. The walls are constructed of an exceedingly compact limestone, which has been quarried out of the formation on which the temple stands. The blocks stand on end, and like those of Stonehenge and of other similar structures, they are of colossal dimensions varying from 10 to 16 feet in height, and from 6 to 10 feet in breadth. As in neither of those, nor in the Phœnician ruins that have been discovered in other parts of the islands have any traces of a roof been observed, it is surmised that the edifices were open-air temples dedicated to the worship of Light, and the Procreative Genius.

Entrance to the temple is obtained by a portal which is made of rudely fashioned blocks of stone; and communication between one chamber and another is effected by means of trapezoidal apertures which have been pierced in the flat slabs forming the walls. On many of these, as well as on the blocks lining the interiors of the chambers, crude attempts at decoration have been made. Both the lintels and pillars of the doors, as well as the sides of the altars are pitted over with small hemispherical indentations, which the learned Maltese archeologist, the late Dr. C. Vassallo in his brochure on the religious systems of the Phœnicians, considered to be symbolical of the starry heavens. the worship of which held a conspicuous place in the Phœnician Creed.

Situated at about a distance of a quarter of a mile up the rugged slopes of a rising knoll, which lies to the west of *Hagiar Chem*, is another though smaller temple of the same type, known locally as *Mnaidra*.

It originally consisted of two chambers, which were constructed on a similar plan to those of *Hagiar Chem*. Dr. A. Caruana is of opinion that the larger of these was used as an outer court to which the sick were brought for the purpose of being cured by the healing deity to whom sacrifices were offered in a smaller inclosure. The excavations which were carried out in 1885, during the Governorship of Sir Lintorn Simmons, showed that the original extent, both of *Hagiar Chem* and *Mnaidra* and of their surrounding courtyards was of considerable magnitude; and numerous other interesting details bearing on the modes of worship and the uses to which the temples were put, were then forthcoming.

Two theories have been advanced to explain the object for which these cyclopean edifices were built. The first of these contends, that they were erected in honour of the seven Cabiri, the seven leaders who took command of the various sections of the people after their dispersal at the Tower of Babel, and who, in the course of time were accorded divine honours by the populace; while the other theory argues that it was to Ham, the son of Noah, who was venerated by the people as the source of light, that these monuments were raised.

In the course of the excavations that Sir H. Bouverie ordered to be made in 1839, a slab and an altar piece, together with several headless idols

were found, and were afterwards deposited in the Museum of the Public Library, Valletta.

The slab had been fashioned out of a block of Malta freestone, and it has carved on it two symetrical spiral figures representing the serpent, the Phœnician prototype of procreative power.

It is supposed that the figures represent the Universe, the upper portion being of the heavens, and the lower half referring to the earth.

The altar, which had also been rudely carved out of a single block of freestone, was found alongside of the slab. It measures 2 feet 6 inches in height, and 1 foot 6 inches in width; and it is ornamented with two pillars, between which is a rudely sculptured representation of two serpents surmounted by a palm branch. Both the altar and the slab are covered with small circular indentations similar to those found on the walls and doorways in the interior of the temples.

The palm-branch was a special characteristic of Phœnician places of worship. It was an indispensable adjunct to all of their religious ceremonies, but it was especially venerated on occasions when a favour was to be solicited.

The altar, Caruana thinks, was dedicated to the goddess Echates, a divinity to whom it is supposed dogs were offered in sacrifice, as considerable quantities of the charred remains of these animals were found intermixed with the debris of the temple.

About three miles to the east of *Hagiar Chem* and situated at the mouth of the Har Dalam gorge, one of the most secluded, and picturesque ravines in Malta, are the ruins another of these paraethons. It is situated on a ridge; and was dedicated to the goddess Melcarte.

Unlike *Hagiar Chem* and *Mnaidra* but little now remains of it save a few roughly constructed blocks of masonry. These, from their position and the very interesting remains found in their vicinity, have been considered worthy of preservation, and a few years ago a partial restoration of the temple was attempted.

In close proximity to the temple, and situated on the shores of the creek of St. Giorgio are a number of caldron-shaped fosse, several of which are now submerged beneath the waters of the bay.

The uses to which these pits were put has given rise to much discussion. Among the country people it is generally supposed that they were used as store-pits for oil; but Caruana is of opinion that they formed adjuncts to the temple, and that the ceremonial fires in honour of the deity were lighted in them.

Proceeding northwards for a distance of two hundred yards, a well preserved specimen of a Phœnician reservoir is to be seen.

This tank, known locally as *Sgharet Meduiet*, was, when discovered a few years ago, filled with rubbish; but owing to the very laudable exertions of a well known Maltese gentleman, Mr. Cachia Zammit, the government were induced to clear it out, and to partially restore it. The pilasters were trussed, the large slabs with which the structure was roofed were afforded additional supports, and an iron railing was built around the steps for the convenience of the many visitors who annually go to inspect the ruins. Latterly, however, the place has been much neglected; and the regrettable vandalism of the visitors is doing much towards entirely destroying this most interesting relic.

From the numerous megalithic ruins that are scattered over this part of Malta, it is evident that the locality was once thickly populated. Nor is it difficult to understand why it should have been chosen in preference to any other part of the island, for not only are the shores low-lying and easily accessible and the bay a safe and commodious one, but the locality itself is well protected from all of the more boisterous winds which blow in the autumn and winter,and the configuration of the surrounding country is admirably suited for defensive operations in the event of an invasion.

The ruins of Melcarte and the town in the vicinity are situated on an elevated strip of land which lies between two precipitous ravines; while towards the east they are protected by the sea. The only way by which they could have been effectively approached was from the west, and even there the rugged nature of the country would have presented many serious obstacles to an invading force.

The site was, however, open to one grave objection, Its water supply was a precarious one.

The extent to which the eastern half of Malta was denuded during the numerous oscillations of level in Quarternary times was so great as to have removed every vestige of the marls and clays

which form the water bearing strata of the islands, and the porosity of the limestone that was left as the surface deposit rendered the rocks of the district unsuitable for the formation of natural reservoirs.

The water supply was therefore very small, and entirely dependent upon the rainfall. To remedy this defect large tanks were constructed in the vicinity of the temples, and the rains of winter were stored in then.

Sgharet Medeuiet was probably only one of many that were erected to supply this very important defect.

Like the other edifices of the Phœnicians, it is built of clyclopean blocks which are placed the one on the top of the other without mortar or a binding medium of any kind; and like them too they are rudely fashioned and unornamented.

In the course of the excavation which were made about fifty-three years ago in the precints of *Hagiar Chem* some most remarkable relics pertaining to the Phœnician religion, were unearthed. Among these were seven statuettes, or idols, each of which has been carved out of the freestone which is in use at the present day for sculptural and architectural purposes.

They are exceedingly rude and grotesque in outline, every limb, and every part of the trunk being globose in form; and they therefore present an eccentric not to say ridiculous appearance.

Vassallo has suggested that they are intended to represent the seven Cabiri, the most highly venerated of all of the Phœnician deities, and to whom temples, similar in construction to those found in Malta, were erected by the earlier Phœnician settlers in Carthage and Beyrout. The signification of the word "Cabiri" is "powerful;" and it is interesting to note that the Maltese still preserve the word with its original meaning in their vernacular. The Maltese word "Kbir" also signifies "powerful".

Four of the figures are supposed to represent males, as they are perfectly nude; but the remaining two have their lower members enveloped in a garment, a fact which has led archeologists to regard them as representing the goddesses Axieros and Axiokersa (Ceres and Prosperine.)

One of the two is in a better state of preservation than the other; and it has a long tress of hair hanging down the back.

The seventh figure has lost the lower portion of its legs. and it has a belt or girdle round the body: it is difficult to say whom it was intended to represent.

All of the statuettes are without heads, but in the neck of each there is a circular hole in which it is supposed that the heads, which were made of more precious materials, were fixed on.

What their appearance then was we have no means of ascertaining, but from the account which Herodotus gives of them, the, impressions made upon him were evidently much the same in character as those experienced by the more modern sightseer. "Cabirorum" he says "simulacra erant Vulcani simulacris similia; forma nimirum et species utriusque ridicula... Cambyses. Memphiticum Vulcani templum ingressus, statuam ejus excepit multo risu."—(The images of the Cabiri resembled those of Vulcan, both being very ridiculous in shape and aspect. When Cambyses entered the temple of Vulcan at Memphis he laughed heartily at the statue of the god).

All of the specimens of handicraft which these ancient people have left behind them in the Maltese Islands are characterized by two prominent features, the first of which is the omnipresence of the circle, as being symbolical of the universe, and the second is the marked partiality that they showed for the figure seven. There were seven chambers in Hagiar Chem, and seven statuettes; and a close examination of the temple shows that in the minor features of construction and arrangement, the figure seven occupies a prominent position.

The difficulties of comunication between Malta and Gozo which existed until within the last few years, have been the cause of the latter island receiving much less attention at the hands of the archeologist than has the sister isle, and therefore the number of the Phœnician relics that has been found there is comparatively small.

Diodorus writes. "Melitam altera insula est, quæ Gaulus vocatur in alto pelago et ipse portuumque commoditate præstans Phœnicium colonia" from which, Caruana concludes that it is probable that several important Phœnician colonies settled down in it, and made it their home.

The most notable of these ruins is the Torre tal Gigant or Giant's tower, a large megalithic

structure which is situated on an eminence in the vicinity of the village of Xaghra. It consists of enormous masses of rock piled one on the other and arranged in a roughly circular form.

The interior is made up of a series of courts which are similar in size, shape, and construction to those of Hagiar Chem.

Of their Phænician origin there seems to be no doubt as they possess all the more characteristic features of the Malta temples.

In the year 1713 while some excavations were being made in the vicinity of the tower an interesting relic of this period was exhumed.

It consisted of an Egyptian Triad of undoubted Phœnician origin, which Caruana thinks was intended to represent Osiris, Isis and Orus,

The front and sides of the statue are covered with hieroglyphics, which have not yet been deciphered. It is now preserved in the Malta Museum.

The sides of the hills and plateaux of both Malta and Gozo are honey-combed with rock tombs that were formerly made by the Phœnicians, and used by them as burial places. Like all orientals the Phœnicians preferred the cave mode of sepulture to any other; cremation and burial in pits being forbidden by their religion. Diodorus tells us they, therefore, carefully wrapped their dead in shrouds "jacere cadaver pro flagitio erat," or they preserved them with "condentes in urnis fictilibus."

The Maltese rock tombs do not differ in any respect from those found at Sidon, and other old Phœnician settlements.

The internal arrangements are the same, and even the physical surroundings are, in most cases, analogous. The tomb usually consists of a vaulted chamber from five to seven feet in length and width, and about two and a half feet high. In the floor are recesses of a hemispherical shape in which the heads of the dead rested, while between each recess are two ridges forming a framework which was intended for the reception of a perpendicular slab to separate one body from another. On either side of the doorways are small niches, upon which earthenware lamps, were placed. Considerable numbers of these lamps,as well as pottery of various shapes and sizes have been obtained from these places of sepulture, but they are now so much sought after by the numerous visitors who have winter residences in the islands, that few tombs are to be found that have not been rifled of their contents. Most of these ancient burying places are devoid of ornamentation.

In the vicinity of Mnaidra there is one which exhibits on its facade a number of scallopings, symetrically arranged, that appear as though they had been formed by a hard, sharp tool; and in another is a crude representation, in paint, of a woman spinning. It is, however, probable as Adams points out in his work on the "Nile Valley and Malta" that much of this ornamentation is of a late date, and may have been the work of the Greeks and Romans who also used the caves during their occupation of the islands.

Undisturbed rock-tombs are, even now, occassionally broken into when the foundations of houses are being dug, or new roads are being laid out, and urns of baked clay and glass amphoras containing some relics of the dead, reward the fortunate finders: but such occurrences are rare.

Several good examples have lately been discovered on Corradino hill; and an interesting specimen is to be seen in the field opposite the bridge leading to Fort Manoel.

It was from a rock tomb discovered in this manner at Ghar Barca that, Abela tells us, a Sarcophagus of Phœnician origin was found; and since then several others of a similar character have been discovered in different parts of the island. They have been fashioned out of a variety of materials of which lead, marble, stone, and terra cotta are the principal.

Of the three now in the Valletta Museum the one that is made of polished terra cotta, and which represents the figure of a young girl, is the one to which the Maltese historian Abela referred in 1797.

Considering the position that Malta occupied as one of the principal trading depôts of these people it is surprising that so few specimens of their coinage should have been found in the Islands. Those that have been discovered are, however, in a remarkably fine state of preservation; and all belong exclusively to the island of Malta. These Phœnico-Maltese coins are made of brass and have been divided by nuismists into five types or classes; a detailed description of each of which is given by Caruana in his work.

Three of these types have, on one side of them, a representation of the head of the goddess Astarte, who was held in great reverence by the people. The reverse side of number. I., according to Caruana, consists of three figures, the middle one representing Adon bearing on his head a pileus, or the *Mitra melitensis* of Varro, in his right hand a sickle, and in his left hand a lash, The figures on either side of him are probably priests bearing staffs and goblets, while above the whole is a legend in Phœnician characters which is common to the five types. The reverse of number II has a representation of the head of Aries with the same legend. Number III is distinguished by a tripod surmounted by a crown; and number four with a bearded male head and a Mercury's *caduceus* and on the reverse side a laurel crown a bell, and the usual legend. Number five has a crab, representing the summer solstice. Specimens of these are now to be seen in the coin bureau of Public Library Valletta.

Enormous quantities of broken pottery occur scattered over the districts in which the Phœnician ruins are, the quality and variety of which show that the people who manufactured it must have been adepts in the art of moulding and baking clay. Pliny tells us that "The Phœnicians were the authors of vitrifacture, or glass-making, having discovered the way of fusing the brittle sand of the river Pelus."

It is not therefore surprising that the number of jars, and others vessels of clay, and of amphora and phials of irridiscent glass that has been discovered, is very considerable.

A common practice that obtained among these people was to disembowell their dead and to deposit the heart, lungs, and viscera in earthenware vessels after which the body and the jars were placed in open tombs.

It is therefore in the rock tombs that the greatest number and variety of these ancient utensils are found.

As a rule the jars are of a pale, sandy-coloured, unpolished material, and have inflated conical bodies, terminating with an elongated lower extremity, which was intended to be placed in a hole in the floor for the support of the jar.

They are of all shapes and sizes, and while some are perfectly plain, others are elaborately but rudely carved, or are covered with hieroglyphics.

Amphora-shaped ware, jar-shaped vases, jugs, bowls, dishes, shoe-lamps, and sarcophaguses are among a few of the many relics that are constantly being found in the tombs among the secluded hills and ravines of the Binjemmas. A magnificent collection of these relics is now preserved in the Public Library, Valletta.

Such are a few of the evidences relating to the earlier ethnology, and historical archeology of these islands. They are not so plentiful as in the neighbouring Phœnician colonies; but they have been so ably interpreted by Vassallo, Adams, Caruana and others that the testimony that they afford us of Phœnico-Maltese habits and customs, agreeing as it does with the inferences drawn from the data collected in other countries, leave us no room to doubt but that most of the interpretations are accurate and indisputable.

The study of Maltese archeology is, however, but still in its infancy. Scarcely a year passes by but what new discoveries are made, and fresh data is, therefore, constantly being accumulated.

By the light of this we hope at some future time to be able to obtain a still further insight into the character of this wonderful people; and it will therefore be as well if, for the present, judgment be suspended on all of the more controversial of the opinions and theories that have been advanced.

JOHN H. COOKE.

(Photographs of all of the relics mentioned in the above article are to be obtained from L. Formosa. Photographer Str. Forni. Valletta.)

Stray Thoughts.

When we consider how little is known, compared with that which remains to be discovered, it is obvious that there are few who cannot do something.—*Carpenter.*

Where the foot finds an easy way, the eye finds the same; where the body finds harmony, the mind finds harmony.—*Burroughs.*

Knowledge is not, like food, destroyed by use, but rather augmented and perfected.—*J. Herschel.*

Every student who enters upon a scientific pursuit, especially if at a somewhat advanced

period of life, will find not only that he has much to learn, but much also to unlearn.—*Herschel.*

Some men are like nails, easily drawn, others are like rivets, not drawable at all.—*Burroughs.*

The view of nature ought to be grand and free, uninfluenced by motives of proximity, social sympathy, or relative utility.—*Burroughs.*

Men and communities in this world are often in the position of arctic explorers, who are making great speed in a given direction, while the ice-floe beneath them is making greater speed in the opposite direction.—*Burroughs.*

To observe well is not so easy a thing as some people imagine.—*Carpenter*

Wheresover the naturalist turns his eye, life or the germ of life lies spreads before him.—*Humboldt.*

Science is nothing more than the refinement of common sense, making use of facts already known, to acquire new facts.—*Sir H. Davy*

The most insignificant insects and reptiles are of much more consequence, and have much more influence in the economy of nature, than the incurious are aware of.—*White*

Wisdom will out; it is the only thing in this world that cannot be suppressed or annulled.—*Burroughs.*

The air is an element of more than weight.—*Isaac Walton.*

Communion with nature awakens within us perceptive faculties that had long lain dormant. —*Humboldt.*

Naturalists can only account for the phenomena they witness by attributing the works of the creation to the action of a Creator.—*Milne Edwards.*

We are much more apt to seek for explanations of phenomena that rarely present themselves, than of those which we daily witness.—*Carpenter.*

There is a species of superstition which inclines men to take on trust whatever assumes the name of science.—*H. Miller.*

As in repeating a well-known song, so in instinct, one action follows another by a sort of rythm.—*Darwin*

Common Beetles of the Maltese Islands.

By Dr. A. Caruana Gatto.

It is a remarkable fact that whilst in most countries, beetles are among the first objects which draw the naturalist's attention, forming one of the chief attractions to beginners and one of the pursuits most looked after by collectors and scientists, in Malta all other Natural History branches have, comparatively speaking, received much more attention, whilst scarcely anything is known about the Maltese Coleoptera.

There is no work dealing exclusively with them; nor has any catalogue of the species to be found here been published. Mention has been made in general entomological works of some species collected in Malta during the short stay of some entomologist and descriptions of these species have appeared from time to time in scientific periodicals which are to be had with the greatest difficulty. Besides these we have only Prof. Gulia's Course of Entomological lectures delivered in 1857 to a class of gardeners under the auspices of Governor Sir W. Reid at the palace of St. Antonio.

The elementary character of this work and the superficial way in which species are dealt with in it, do not allow us to consider it as answering any other purpose beyond that of a series of popular lectures on Maltese Entomology, what Prof. Gulia explicitly declares in his introduction. It must be acknowledged though that Gulia's work, as the first and only contribution to the study of our insects is very useful and it shows that in comparison with the present time much greater importance was attached to and more notice was taken of Entomology as applied to Agriculture 40 years ago than is done at the present time.

We had not then the orange and vine disease nor did our countrymen fare so badly as now-a-days, but the agricultural education of gardeners was thought much more of. It was thought that a course of popular lectures on economic and agricultural entomology would considerably benefit the Maltese gardeners, a class which have such wrong ideas of the insect-plagues which so often attack their fields and gardens. Unfortunately it was, however, the first and last of what might have been a most useful series of annual lectures. Can

anyone believe that the necessity of repeating them at certain intervals has no longer been felt? Or can any one say that our gardeners have a sufficient knowledge about agronomy, horticulture and entomology so necessary an accomplishment for them, or that our gardens and fields have been much improved by this neglect? I do not think a single person will venture to say so, amidst the outcry which is now being raised against the miserable state into which our agriculture has fallen.

To return to my subject. Though the bibliography of our Coleoptera is so very scanty, there is little doubt that collections of Maltese beetles have been made at different times, and we know that Mr. Leach and Dejean have collected in our Islands, and still later also Messrs Mamo, Schembri Prof. Gulia, Father Libassi, Fauvel, DeLaGarde, Walker and Pool. We regret that we have no records of these collections which have had so much valuable time and labour spent upon them, and this chiefly owing to the carelessness of those in whose charge some of our older ones, such as those of Mamo, Schembri and Gulia, were placed, and who suffered them to decay and waste away.

This has brought us to the regretable fact that at present not a single collection of Maltese insects exists in any of the public museums of Malta, except some traces of Libassi's collection at the University Museum.

Under such circumstances it would be unwise to attempt to give a complete list of the beetles found in Malta. Much time is required before anything satisfactory can be done in this line. What everyone could do is to further the study of Maltese beetles noting down and publishing personal experiences in collecting. For this reason I have thought that a few words on our common beetles might not be devoid of interest to entomologists and students of our insect fauna.

I have for a long time been cherishing the idea of publishing a detailed catalogue of all the species collected by me in our Islands, but I find that there are yet too many gaps to be filled up, too many doubts to be explained and much more work to be done before such a list would have the exactness necessary even for a first contribution to a thorough study of our beetles.

I will therefore in this note refer only to such species as are seen by everybody and which may be readily collected.

As to their determination I am much indebted to the kindness of Mr. Reitter of Paskau to whom I have sent specimens of every species collected, and to whose authority I refer.

Locally the species I mention offer but little interest, because as I have already said, they are almost all frequent or common forms, but in relation to the Coleoptera of the region some of them are of marked interest and are considered either as rare forms or as endemic to these Islands.

At all events I am certain from my experience that if it be only on account of the correct determinations of the species, these few hints may be of some aid to the beginner who just at his first starting often stumbles in the great puzzle of naming his captures.

I cannot pass over in silence the difficulty I met with when I first began my collection. Persons who live in great cities and have every opportunity to compare their specimens with vast museum collections and to refer to standard books of regional entomology, who go over again the well known tracks which so many of their predecessors have carefully prepared for them can hardly imagine the difficulties which the entomologist comes across in our small islands and the length of time required for the work which has to be done alone. On the other hand I must say that in the exploration of such a virgin field, in the laborious task of collecting, setting and studying the specimens collected, in the consequent correspondence with competent authorities about correct naming, and in the pleasant work of drawing the first lines of our Coleoptero-fauna I have spent some of the happiest days of my life. Not that our beetles are remarkable for bright colours, or extraordinary forms, on the contrary they present on the whole a rather dull appearance and can never compare favourably with the rich insect fauna of Sicily or the Islands of the Levant; but if entomological pursuits are a very genial work for all insect-hunters and lovers of nature in countries where every inch of ground has been explored, they are undoubtedly much more interesting and delightful

in an Island where every season and new locality has some particular species of its own which often gives a chance of an interesting discovery and where excursions seldom fail to add new forms.

Reserving all details about rare and minute species for a future occasion, I shall follow no scientific order in referring to the species mentioned in this note, but I shall class them according to the time at which they appear.

Generally speaking, it may be said that Autumn and Spring are the best time for beetle-hunting, so that the stormy winter days and the summer burning sun do not cause much loss to the collector, who can employ his time usefully in setting his specimens. This holds good in general, because there are a few species, especially among those forms which one finds "chez lui" that are to be found at all times. Of these, *Blaps mucronata Latr.* and *B. gigas L.*, *Akis bacarozzo Schrk.* and *Scaurus vicinus Sol.* are never missing in cellars or in damp localities. The *Alphitobius diaperinus Panz.*, *Sylvanus surinamensis L.*, *Laemophloeus pusillus Schr.*, *Calandra granaria L.* and *C. oryzae L. Tenebrioides mauritanicus L.* and *Tenebrio molitor L*, are also unfortunately almost constant guests of all grain and wheat stores, as *Echocerus cornutus F.* is of all chests where it has a chance of finding biscuits. A pest to the house is *Lasioderma bubalus Fairm.* which I have found in all imaginable places, including the library, the kitchen and the house terrace, and which is not very particular in choosing its abode as I have found it on walls, under stones, on flowers, in books and not seldom in sweetmeats.

Among leaves and peas it is well nigh impossible not to find numbers of *Mylabris pisorum L.* and *M. rufimana Boh.* whilst their congener *M. chinensis L.* is by no means rare on walls.

Coming out of the protection afforded by houses and buildings, the influence of seasons begins to be felt, and soon after the first September rains one is certain in a walk in the country or even in the neighbourhood of Valletta to see in abundance the *Atheucus variolosus F.* busy in forming and rolling its dung balls, helped sometimes in his task by some stray *Copris hispanus L.* and by the *Geotrupes leavigatus F.* which may be seen everywhere struggling on the ground.

Prof. Gulia mentions also the *A. sacer L.* and *A. semipunctatus F.* which I have never seen, and he adds the *Geotrupes stercorarius L.* which I would rather consider as *G. Douei Gory.*

Such a cursory examination as this is not however sufficient; should the collector wish to know more of the denizens of these beetles haunts, he must make a closer investigation; the research is by no means one of the pleasantest, but it is mostly very successful, and among myriads of small *Staphylinidæ* and numbers of the black *Aphodius granarius L.* and the yellowish *Aph. hydrochœris F.* he is certain of finding *Bubas bison L.*, *Hister major L.* or some shining pretty *Saprinus*, perhaps the *S. chalcites Ill.* or *S. nitidulus Payk* or the *Hister ventralis Mars.* These species will be found in autumn and winter and also in spring, when there will be added to them *Onthophagus taurus Schr.* and *Onth. marginalis Gell.* and other some species of *Saprinus* or *Aphodius.*

From September to May, and sometimes the whole year round, the loose stones on rocky grounds or on walls by country waysides shelter *Nebria andalusica Ramb.*, *Olisthophus fuscatus Dej.*, the extremely common *Calathus melanocephalus L.*, *Ophonus meridionalis Dej.*, *Pleurophorus caesus Panz.*, *Lampyris brutia Costa.*, *Brachycerus albidentatus Gyll* and *B. barbarus L. Gonocephalum rusticum Oliv.* and *Phylax melitensis Baudi and Stenosis melitana Reitt.* two endemic species of common occurrence.

Hovering by the road in search of prey are also seen, from Autumn to Spring, *Ocypus olens Mull* and *Creophilus maxillosus L.*, *Pentodon punctatus Vill.*, *Tentyria sardoa Sol.* and *T. Laevigata Stev. vœr. Leachi Baudi* a local form, *Pimelia sardoa Sol. var subscabra Sol.* one of the commonest species, Representatives of the weevel tribe *Sitona griseus F.*, *S. lineatus L.*, *S. humeralis Steph.*, and *S. discoideus Gyll.*, *Hypera phylanthus Olive.*, *H. punctata F.*, and *H. crinita Boh*, and two *Otiorrhynchi* the *O. lugens Germ* and *O. cribicollis Gyll.* are sufficiently common on walls, and under stones.

The golden beetles, are extremely common in Autumn of which *Chrysomela grossa F.* may be seen in batches on the *Calamintha nepeta*, the *Chrys. americana L.* on rosemary, and *Chrys. Banksii F.* less frequently under stones. In moist localities

there is no difficulty in finding specimens of *Bedelius circumseptus Germ.*, *Licinus granulatus Dej.*, *Silpha Olivieri Bedel*, *Asida Melitana Reitt.* a new local species, *Necrobia rufipes Degeer* and the small *Thorictus grandicollis Germ.*, *Anthicus hispidus Rossi* and *A. formicarius Goeze.*

In January and February and also so early as December the black oil beetle *Meloe tuccius Rossi* is frequently seen in country roads, in fields or grassy ground, the *Meloe purpurascens Germ.* of a metallic dark green or purple is not so common, but may be seen at Marsa, Fort Manoel and in gardens. I must note with regard to oil beetles as a fact of not frequent occurrence that some years ago I collected at Marsa a specimen of *M. tuccius* coupled with another of *M. purpurascens.* Not knowing then their specific difference I was so much surprised that I considered the two species as the sexes of the same one, but I soon found that was a very exceptional case.

With oil beetles appear specimens of our endemic and interesting new species of *Hapalus*, which Mr. Reitter has had the kindness to name *H. Caruanae.* This pretty insect is found from January to February on walls or on the grass by the roadsides at Musta, Attard, Naxaro, St. Paul's Bay etc. The male of a deeper tint than the female has its thorax and head covered with velvety hairs and possesses stronger antennæ; the female has generally a voluminous abdomen, which the orange elytræ marked with a black spot at their base cover hardly by two thirds, but after the laying of a long uninterrupted string of eggs in any imbricate disposition the abdomen attains its usual dimensions and the elytræ cover again the whole body. All the parts of the insect have a marked smell of red pepper.

It is not to be expected in Malta abundance of water-bettles, but in and about water pools and slow running streamlets at Imtahleb, Ghirghenti, Gneina etc, under stones or among water-algæ one is sure to find *Helochares lividus Forst.*, *Berosus signaticollis Charp.*, *Agabus nebulosus Forst. Parnus algiricus Luc.* and *Hydroporus tessellatus Drapiez*, whilst the shining black *Meladema coriaceum Lap.* darts rapidly in water reservoirs often coming to the surface for a new plunge.

Sphæriduim bipustulatum Marsh another species belonging to the *Hydrophilidae* is common enough in animal or vegetable refuse.

Spring with its enlivening influence and the gay array of flowers which it brings into blossom haunts out of their winter retreats hosts of insects which begin to appear at the time of the spring passage of birds in the Island. The innumerable larvæ and pupæ of beetles which had been waiting the first warm days come out and

"Myriads on myriads, insect armies waft"
"Keen in the poison'd breeze; and wasteful eat"
"Through buds and bark into the blacken'd core"
"Their eager way."

This is the best time for collecting, and the valleys gardens and fields yield to the entomologists a most acceptable harvest of flower hunting beetles. Among these our two species of Barbary bugs, Maltese "Busuf", *Epicometis squalida Scop.* and *Leucocelis funesta Poda* occupy a prominent place as two of our most destructive beetles. No flower is safe from their attacks and they destroy the caducous white petals of the hawthorn as they spoil the blossoms of the most elegant cultivated roses or lilies; for them nature's contrivances to protect flowers are of no effect, they tear through the corollas of the snapdragon no less than the delicate perianths of the wild tulip and of the star of Bethlem. They are a scourge in the floral world, their visits meaning certain ruin to pistils, stamens and ovaries, and though they may help by their hairy elytræ the fertilization of flowers, the benefit derived therefrom bears no proportion to the great damages they cause.

The branched flower-stalks of the asphodel carry lots of a pretty longicorn the *Agapanthia cynarae Germ.* and the Composites swarm with *Attali*, *Psilothrix and Anthreni* which make themselves useful in their fertilization and offer to the entomologist the bright green or bleu *Psilothrix cyaneus Oliv.* and *P. melanostoma Oliv.*, *Attalus dalmatinus Er.*, *Haplocnemus pectinicornis Luc.*, *Anthrenus fasciatus Herbst.* and *A. verbasci L. Drilus flavescens Rossi* may be captured in land shells. Among weevils *Mylabris imbricornis Panz.*, *M. bimaculata Oliv.* and *M. laticollis Boh.* will be found on Umbellifers. Bigger flowers are subject

to visits of *Lixus algirus L.*, *Aethiessa floralis F.* and *Oedemera simplex L.*, whilst *Labidostomus taxicorins F.* moves its serrate antennae on every sort of flower. Mallows are infested by *Podagrica semirufa Kust.*

Some of the handsomest of our beetles appear now. Rosaceous trees will afford the rose-chaffer *Potosia floricola Herbst. Var. cuprina Motsch*, and two longicorns the *Cerambix nodulosus Germ.* and *Niphona picticornis Muls.*

In the moist soil at Marsa the collector will be glad to find the handsome *Chlaenius azureus Duft*, *C. variegatus Fourc* and *C. festivus F.*, besides *Stenolophus teutonus Schr*, *Acupalpus dorsalis F.*, *Anthicus 4 guttatus Rossi*, *A. minutus Lat*, and *A. humilis Germ.* and the ever varying *Anysodactylus pœcilioides Steph.* which presents all shades of black, bluish black and metallic green, so that at first it is very easy to mistake it for 5 or 6 different species. *Scarites planus Bon.*, *Aristus capito Deg.*, *Ditomus calydonius Rossi* and *D. dama Rossi* and *Acinopus ambiguus Dej.* have also no claim to be considered as rarities.

A superficial search under stones or on walls will reveal *Cleonus excoriatus Gyll.* to which in June will be added *C. madidus Oliv.* plentiful on house terraces, and *Larinus flavescens Germ.* on thistles.

In summer the more remarkable species are the tiger-beetles on sandy beaches like Birzebbugia, Marsascala, Mistra and the Marsa. Of these *Cicindela littoralis F.* is common and *C. melancolica F.* is rarer. In fields the orange-coloured *Aulacophora abdominalis F.* feeds plentifully on melon and cucumber plants, and *Epilachna chrysomelina F.* lives on the *Ecballion elaterium.*

Before concluding I must not forget to mention one of our commonest beetles, the ladybird, *Coccinella 7 punctata L.* which together with her two allies *Chilocorus bipustulatus L.* and *Echocomus 4 pustulatus L.* wage for us a useful war on scale insects.

No one is to expect that I could exhaust the subject in this short paper. I shall be satisfied and amply repaid for my labour if it induces others to continue this study to which I could not nor can henceforward devote the amount of time required.

When we have such a limited area before us and such an interesting field for our researches we ought not to stop until it be fully explored and before a catalogue of our beetles be completed. Such a work will be not only of local interest but also a valuable contribution to the knowledge of the distribution of beetles in the Mediterranean Region.

The Victoria Cavern.

The Victoria Cavern is situated in the Har Dalam Gorge midway between the Har Dalam and the Asciak caves.

The gorge probably owed its origin to the erosive action of torrential volumes of water that swept through it at a time when the geographical and climatal conditions were of a much severer type than those that now endure; and it may, therefore, be assumed that most, if not all of the numerous caverns, caves, fissures, and minor gorges with which the sides are perforated, were formed at about the same period, and by means of the same turbulent agencies.

The sides of the gorge in the immediate vicinity of the Victoria Cave are very irregular in outline, and variable in character, presenting on the off sides, mural escarpments scored with parallel, longitudinal undercuttings, showing the volume and power of the torrents that had formely swirled against them and had affected the final sculpturing of their bold reliefs; and on the near side taking a less abrupt form, which towards the summit inclines backwards and forms long, sloping and softly rounded banks.

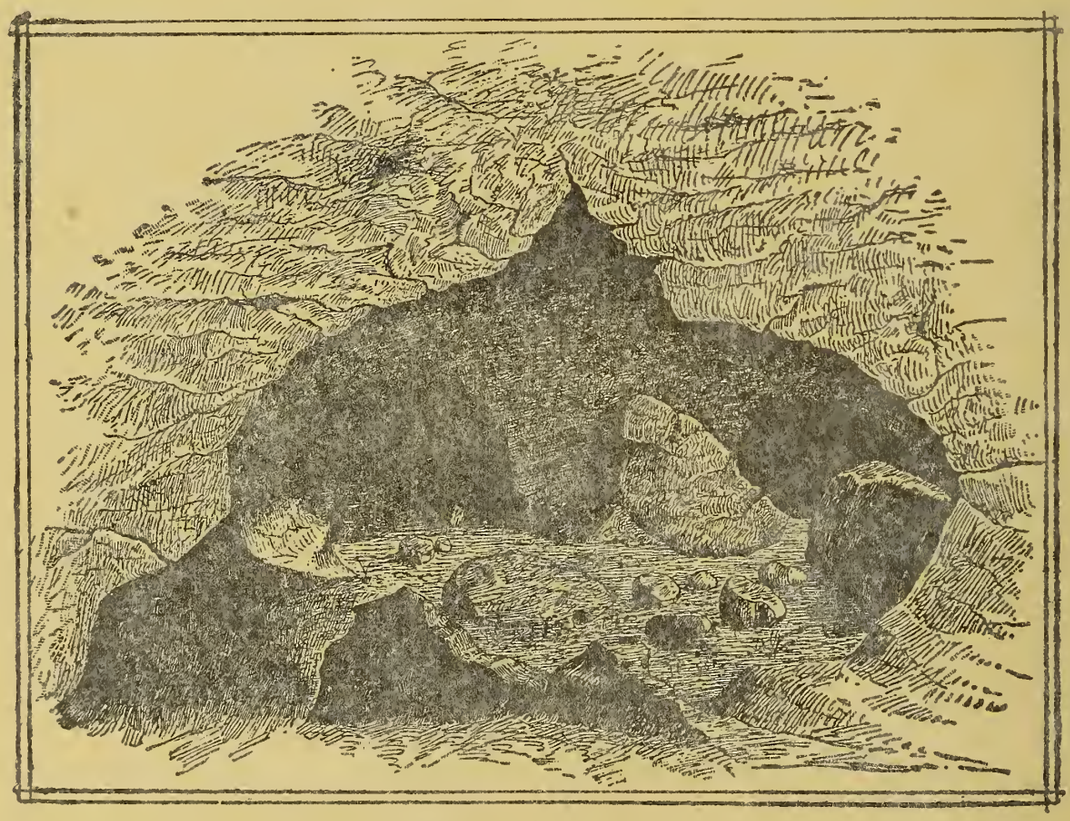
Owing to the numerous diversities of internal structure and surface configuration of the rocks in the locality, both sides have been much fissured and broken up; and huge masses of rock have been thus displaced and in many cases precipitated into the gorge bed.

It was by the action of one of these local faults that the existence of the Victoria Cave was revealed.

This cave, which may be appropriately classed as a fissure-cave, originally consisted of at least two large chambers and two galleries of considerable length.

The simultaneous weathering along the jointing and the bedding planes caused the displacement of an enormous rock mass, and, by carryng away a half of the first chamber, it exposed the other half in the vertical cliff face. The exposed chamber now forms the main entrance to the cave. It is situated at a height of about forty feet above the present bed of the gorge; and after penetrating the cliff face for about twenty feet in a southerly direction, it branches off and forms two galleries, the directions of both of which are roughly parallel to that of the gorge itself.

The roofs and sides of both the chambers and of the galleries are most irregular in outline, being much broken and fissured; and the bottom is covered with a stiff, red clay intermixed with angular rock fragments that have broken off and fallen from above and around.



After passing through the entrance the first chamber opens out; but as we advance inwards, it contracts abruptly and forms a funnel-shaped orifice which serves as an entrance into a second chamber.

The roof and sides of this branch are also very irregular in outline, and show distinct evidences of curvi-linear groovings, and semicircular undercuttings similar to those found in the gorge and in the Har Dalam Cave. These evidences of water-action are present in all of the embranchments; but they are more pronounced in this chamber than they are in the first, where, in many instances, they have been almost obliterated by the breaking away along the joints of the overhanging rock masses.

Broad sheets of stalagmitic incrustations formed by the lime-charged waters, which are constantly percolating through the porous rock, cover a considerable portion of the sides; and serve, by means of their insoluble constituents, their fantastic shapes, and their gorgeous colourings, at once as a restorative, a protective, and a decorative agent.

At the distal extremity of the cavern these sheets are replaced by thousands of minute pendants of pearly whiteness, many of which have coalesced and formed festoons and graceful *alto-relievo* traceries.

From the curves and extremities of many of these, pellicles of limecharged water depend, the reflected light from which gives forth kaleidoscopic changes of the most gorgeous colourings that scintillate and sparkle in the semi-gloom, and serve to impart to the scene a weird, not to say an impressive aspect.

The dimensions of the second chamber are 16 feet wide, and from 6 to 8 feet high.

Branching off from it are the two galleries, the one on the left-hand side and the other on the righthand side of the chamber.

That on the left is 10 feet long, 8 feet wide, and 3 feet high. It was filled with a dry indurated clay, intermixed with which were numerous rounded boulders, fragments of pottery, and bones and teeth of sheep, pig, dog, and ox.

A section of the deposits in this gallery exhibited the following sequence of beds:—

A. A stratified layer of rounded boulders intermixed with an indurated red clay: one foot in thickness.

B. A stratified layer of indurated red clay, three feet in thickness, containing teeth and bones of sheep, pig, dog, and ox, together with occasional angular fragments of Lower Carolline Limestone that had evidently been derived from the roof or sides of the chamber.

The bottom of the gallery was much fissured; and the distal extremity terminated in a close round end.

The gallery on the right hand side has a funnel shaped entrance which is about 4 feet high and 7 feet wide, after passing through which it opens out into a spacious chamber measuring 15 feet wide and from 3 to 6 feet in height. This in its turn contracts into a narrow passage which leads into another enlargement.

The total length of the gallery is 132 feet, in the course of which it expands and contracts five times.

The width varies from 6 to 15 feet; and the height from 4 feet to 2 feet 3 inches.

Like the other parts of the cavern the roof and sides are much fissured; but none of the fissures are of any notable size.

For a considerable portion of the length of the gallery progress can only be made by lying at full length and sliding over the wet clay on ones side. In consequence of this the people of the district know nothing of the nature or extent of the inner galleries and, therefore, like many other of the localities in the islands which are difficult of access, this cavern, too, has its legend. (1) Chev. G. Saxe the Russian Consul accompanied me in this exploration; and assisted me in taking the measurements.

The gallery is filled to within a few feet of the roof with a very plastic, greyish yellow clay. A section cut through it shewed it to be very homogenous in character; and a series of borings revealed the fact that it varied but slightly in its thickness in any part of branch.

From the excavation, which was made near the mouth of the gallery, several teeth of *Canis*, a portion of a skull of *Sus scrofa*, fragments of the limb-bones of *Cervus barbarus* and numerous specimens of a species of *Helix* were found.

From the configuration of this cave as well as from the stratigraphical and lithological characters of its deposits, it is evident that it owes its origin to the same or to similar causes to those that were in operation when the Har Dalam beds were laid down.. Being situated at the same height above the bottom of the gorge bed, it is probable that it was flooded by the same waters that assisted in depositing the other cave beds; but its smaller dimensions as well as the inaccessability of its situation rendered it but ill suited to receive the animal and other remains, that were brought down by the flood waters of the gorge; and hence the organic remains that occur so plentifully in the Har Dalam Cavern, are here found to be almost absent.

The occurrence, however, of a rude coarse kind of pottery associated with the remains of such domesticated animals as the goat, sheep, ox, and dog, in the superficial layers, indicate its occupation by man; but the nature of the pottery, the sub-fossil condition of the bones, and the position of the remains in the layers all tend to show that the occupation could have been of no very recent date

J. H. C.

(1). *It is said that this cavern is a portion of an under-ground passage which terminates at Asciak, a village three miles away.*

The Orange Disease in Cape Colony.

CERATITIS CITRIPERDA—*(Mac Leay).*

By S. D. BAIRSTOW, F.L.S.

(Continued).

This brings us to the great work of the life history of *Ceratitis*. When there is no more fruit in a given district' what becomes of its progeny? Do the flies undergo an alternation of generation? Can the ova be deposited in some different manner,

and be held over, so to speak, through the barren winter months? Or the larva, have they any power of secretiveness, any dormant stage previously hidden, which serves to tide over a period of enforced quiescence? The pupæ, do they sleep the sleep of death in months of desolation? Perhaps the imago has some subtle latent natural gift which tides them over the barrier. This is to hibernate. I do not mean to say that they remain hidden from view and stationary throughout the winter month, for proofs are against this theory. Specimens which hatched in my cage on January 18th were alive right up to April. One day I would find three or four solitary individuals promenading about. Exposing the cage to the sun's rays, over thirty or forty flies would soon come from their hiding-places. At the fall of our fruit season in Cradock (beginning of March), when only figs were obtainable, and large unmaggoted fruits, I ceased feeding *Ceratitis*. It made no difference to the fly's vitality, but hibernation was thus suggested and acted upon. Connection was negatived, both male and female are extremely tenacious of life, and require but little sustaining power. I see no reason to disbelieve that in the natural state our fly even whilst hibernating, leaves its winter abode temporarily, and basks awhile in the sun, returning to some secluded spot, again to claim protection from the inclemency of weather. My anonymous friend at Graham's Town says that he has seen the flies "at rest" in outhouses during the winter months.

But whilst I can positively prove that the imagos hibernate, I cannot assert that the purpæ do not. I have never known them to do so, but I cannot suggest any feasible reason or cause why they should not. Unfortunately my work on this point has been slightly hurried, and I cannot speak on hibernation through and through, but later the result of my notes shall be made public. My flies are hibernating now, *i. e.*, April, but fitfully, as I have explained.

"I remarked that I thought in warm localities they are active all the year: I intended to say that when not too cold some flies were to be found at any time, especially if there were any ripe fruit about, and it is my impression that a few flies are are always on the move so long as there is no actual frost. Proof of this comes in the orange affected during winter, and also in the guaves which are got from the coast badly affected, at the time when frost makes them almost unknown here. We do not notice the fly during winter, but we should not notice it during summer, either, did the larvæ not betray their presence. But during some winters we have had hard frosts, and no ripe fruits on which they can live, for at least six months, so it is evident they must be able to endure that length of time either as chrysalids or as dormant flies, and that it is in the former state is, I think, proven by the attacks made during winter, being less severe than those in summer."--

Lest there should be any misunderstanding I must explain that my experiment previously detailed was with a solid block of ice. The insect was placed therein (in a glass tube) for one hour, and yet on exposure to the sun it rallied. Few living objects could stand such immersion, but *Ceratitis* did, and had not the change been too sudden and cruel, it would probably have borne the strain upon its constitution. Mr. Sim's remarks qualify my own, and there is no improbability in the idea that during hibernation an insect does awaken under favourable auspices and anticipate season. And thus, once more the peach-maggot or fly is indeed a very dangerous customer—wiry, long-lived, alert and active, absolutely and emphatically hibernative as a pupa. We may take it then also, without fear of contradiction, that the maggots get up maltitudinous strength with advancing and favourable season, and their preference for various kinds of fruit is proved by appearances and personal calculation gathered during my short colonial rambles this year. I reckon it in order of preference, as follows:— 1, peaches; 2, apricots; 3, pears; 4, nectarines; 5, figs; 6, oranges; 7, guavas; 8, apples;—but the arrangement may alter according to circumstance and district (1). Lastly, I have to my utter astonishment, received specimens from Mr. Rowland *Cradock*, of a small, poor-looking, black grape (named as Stein, var), containing veritable peach maggots. This fruit was ripe at the end of January. I was, however, not successful in rearing the flies,

(1) *Mr. Ziervogel, Cradock, assures me quinces are also liable to attack.*

as there was insufficient scope for feeding and in transmission the larvæ, five in number, died. I am hopeful that for some reason they had been deposited by an over-anxious or careless mother quite out of her latitude, for it would indeed prove a calamitous affair if *Ceratitis* transfered all or any portion of its affection, to our much prized and petted vine. Mr. Francis, now resident at Middleburg, informed me that when he resided in Bloemfontein, he observed a preference shown by the maggot for Taai-pit or Clingstone peaches. The Rev. Mr. Murray thinks the "Breda" our best apricot as regards freedom from maggot; the "Kaisha" very bad for parasites; "Ceylon" ripens mostly on one side and that is maggoted; "November" very fair; "Belle Baume" an excellent peach. Granted that this is so, and one fruit more adaptible than other, less subject to parasites and a better class of fruit altogether, we should naturally expect growers to rear superior types. This question is worthy discussion as therein "might hidden lie" a partial solution to our difficulty, by my own opinion, from a notist's point of view alone,is this—*citriperda* is no epicurean. All is grist that goes to its mill. Its discrimination rested with taste, instead of oviposition I could readily accept such a distinction, or were the tissues of one variety more pliable and softer than another according to the fly's test, then its living sword would be able to appreciate the ease of penetration. But I do admit and insist that ancient, played-out trees of any kind of fruit are most affected by the maggot, and here we have matter for thought.

(To be continued).

The Utilization of the Waste Lands in Malta and Gozo.

The article on the utilization of the waste grounds of Malta and the introduction of the sisal industry into the island has excited a considerable amount of interest, and has, on the whole, been most favourably received by the press and the public.

In view of the number of letters I have received and of the number of verbal questions that have been put to me, I now propose to give a few more details bearing on the subject.

The proposals contained in my last article may be classed under three heads:—

I. That the rocky wastes, which comprise nearly 37 per cent. of the islands total areage should be trenched and soiled. This soil is to be obtained by crushing the rocks and mixing the debris with existing soil or with the Greensands, and other phosphate-bearing rocks in the islands.

II. To break up, and economise by spreading over the areas around them, the beds of Quartenary loams which occur in patches in different parts of the Islands.

The *unutilized* patches now represent about 5 per cent. of the island's area.

III. To introduce the industry known as "Sisal growing" either in what are now the uncultivated districts, or in those cultivated areas where the produce at present does not give an adequate return for the capital and labour expended—or in both.

The project, though old in name is original in method; and, like all new proposals, it has not entirely escaped the fire of adverse,though I believe well meant, criticism.

The difficulties which have been advanced by some are not of such a nature but that they may be readily overcome, if firmly and energetically grappled with.

The conservatism of the Maltese farmer is, to my mind, a phrase only.

He may be non-progressive in point of fact; but his conservatism is due rather to force of circumstances than to an innate non-appreciation of the benefits which are to be derived from adopting the latest methods and implements in the practice of his calling. Proposals have been made to organize technico—agricultural classes for the purpose of teaching him in the vernacular; but the schemes have never gone beyond the "*talk and paper*" stage. Brochures have been printed, commissions have sat, and papers without number have been written for his benefit—but always in English or Italian, languages which are as foreign to him as Anglo-Saxon would be to a Chinese.

How then can it be expected that he will advance if no opportunities of learning the views of those who would see his agricultural methods improved, and his position bettered are afforded him?

Year after year he plods on, as his forefathers did before him, and when now and again a spasmodic attempt is made to regenerate him in matters agricultural by bringing a new, and to him, fearful piece of machinery to his notice, the very novelty of the instrument startles him—we ourselves did not take to the locomotive till we had been educated up to it,—and because he looks askance at it, we reproach him with his conservatism.

My observations have shown me that the Maltese farmer is specially open to reason in those things immediately affecting his material welfare: and I think that, were adequate inducements held out to him, and were he educated in modern ways and methods, he would not fail to rise to the occasion, and would show that the reproaches now levelled at him are as unreasonable as they are unjust.

Another difficulty which has been advanced against the carrying out of the scheme is the impoverished state of the islands' exchequer. Money is of course an essential; but as I shall presently show, the sum necessary is by no means a startling one, and I quite fail to see why, if the Bahamas with their poor resources, their people—a race which will in no way compare with the Maltese agriculturist for thrift and industry,—and their want of capital, could effect such results in so short a time, I quite fail, I say, to see why the Maltese people, by imitating the Bahamese method, could not do the same.

In the Bahamas energy and determination of purpose constituted the mainspring of the movement.

Consul McLain U. S. A. in his report says:

"The progress made in the development of sisal culture in the Bahamas during the past 12 months is marvellous. One year ago there was scarcely a dollar of foreign capital, and very little local, invested in this business in the colony, while to-day parties from Great Britain, Canada and Newfoundland, representing large resources, are interested in sisal, having bought tens of thousands of acres of Government land and are industriously engaged in planting the same to the full measure of their ability to procure the material..... The unexampled succes of sisal industry in so brief a period in this colony is entirely attributable to the business-like, systematic manner in which it has been managed by the present governor, Sir Ambrose Shea, who has all along taken a most earnest interest in the matter. He is a man of large experience in affairs, and had practical knowledge of the proper way to manage industrial enterprises. From the start he realized that this industry would be the salvation of the Bahamas, and, setting his heart upon it, he pushed it forward with great energy and prudence, overcoming numerous difficulties, surmounting obstacles, encouraging the faint-hearted, until now the people are touched with his own enthusiasm and the industry is fairly afloat. He visited England and by personal effort enlisted capitalists, and procured large investments."

I have already shown that, in these islands, soil and climate are alike favourable for the establishment of the sisal, for they are in every respect analogous to those that obtain in the Bahamas.

But I have been asked—

"Is it possible that the plant will thrive in such rocky arid regions as those which are found in the Malta plateaux." Referring to the hardy nature of this plant, and to the soil and conditions that are best suited to it, Mr. W. C. Dennis, writing to the Commissioner of patents, stated that "arid rocky land is suited to the growth of the plant; and especially where *there was a superabundance of of lime*, it was *more favourable* to sisal cultivation." The italics are mine. And the Kew Bulletin says that the soil best fitted for its culture is of "a gravelly, stony, and in some places of a rocky character, the plants thriving best yielding the largest amount of fibre in comparatively arid districts, only a few feet above the level of the sea."

And Mr. Ranson, in his report to the U. S. Agricultural department, notes that "land which is generally considered too poor in the constituents necessary to plant life to make it worth while to attempt any cultivation upon it.....and that the shelly, saline sands will be found to suit such plants as the *agave* (aloe), both chemically and physically better than the rich black hummock land." Mr. Preston, the special commissioner for the Bahamas, makes a very pertinent remark bearing on this. "In fact, any land that is shallow, impoverished, and that will grow nothing else,

suits it." But perhaps the most interesting of all for the Maltese prospector are the remarks made by Mr. John I. Northrup, in his article on the cultivation of the sisal in the Bahamas, in the course of which he said:—"It was at first a source of wonder to the writer that anything at all could grow there, for the surface is very largely the bare coral rock. However it is rarely smooth, but is rough and jagged with innumerable points and crevices..... it is when growing on the bare rocky ground described above that the sisal is said to produce fibre of the best quality;" and Mr. James R. Rae in his report to Sir Ambrose Shea, the Governor of the Bahamas, says that "On broken rocky surfaces containing innumerable potholes and crevices in which is deposited the ordinary earth, the plant luxuriates. Nowhere have I seen it appear more flourishing than on such lands."

Here, then, is I think a complete answer to the question put. Salt, lime, phosphates and arid conditions are all favourable to the propagation of the plant: and of each and all of these we have an abundance. Besides which "Broken rocky surfaces containing innumerable potholes and crevices and filled, or partially filled with soil, are the main characteristics of 80 per cent of Malta's waste lands; and I am therefore justified in asserting that these lands are in every way admirably adapted for the industry. This being so, the area that would have to be "wholly prepared" would be relatively a small one: most of it would, however, require a partial preparation.

With reference to the expense of working the rock, it is not possible to do more than give a rough estimate of the approximate cost.

Before entering into this part of the question, I wish it, however, to be distinctly understood that I do not consider it possible to turn the waste grounds into "orchards and gardens" as was hinted by the editor of the "Standard." They are not suited for such a purpose, besides which it would be a truly herculean, not to say impossible, task to provide soil sufficient to spread promiscuously over such a vast area, even to a depth of but from 1 to 2 feet, and afterwards to properly irrigate it.

My proposition briefly put, resolves itself into this. When the absence of potholes renders it necessary, pits should be cut in the rock measuring say 1½ feet by 1½ feet by 2 feet in depth. The cost of doing this would, I am assured by those who have engaged labourers in trenching for agricultural purposes in Malta, be from 8d. to 10d. per palmo. I will allow a wide margin and say 6d. per square foot. Each pit would therefore cost about 1s. 1½d. Where it is necessary to prepare the whole district these pits should be dug in parallel lines with spacings of 7½ feet in the one direction and of 7½ feet in the direction, at a right angles to it. One tummolo of ground would therefore have about 170 of these pits; and the cost at 1s. 1½d. each would be just £ 9. 11. 3 per tummolo. (Mr. C. Dodge U. S. Agent states that 600 to 650 to the acre is sufficiently close, equal to about 170 to 180 to the tum.) The collection of the soil, and, where it is not procurable, the crushing of the rock for the purposes of making it, is an item on which I can pronounce no definite opinion, but it would not be a very great expense for in no part of Malta is the rock absolutely bare, and the debris obtained from the cutting of the trenches would, when crushed and mixed with the loams found in neighbouring fissures make a suitable and fertile soil.

These pits would require an equal number of young sisal plants; and these (Mr. Bier in his report to the United States Commission states) cost a half-penny a piece. The Bahamians (Vide report of Mr. C. Dodge the agent for the U. S. Commission) buy their plants at 7 cents. a dozen: but at the present time these prices have been somewhat increased owing to the stringent regulations enforced with reference to the export of young plants to other countries.

Both in Florida and Spain the young suckers are, however, to be obtained at nominal prices.

Here then we have the principal items of expense, which would have to be incurred in the initiation of this very lucrative industry.

Compared with what it has cost the promoters in other countries, this is a very moderate expenditure.

This would be the approximate cost supposing that it were necessary to trench the whole of the area; but this, as I have shown, would be unnecessary. And there can be no doubt that this estimate would be considerably reduced if, where large areas had to be cleared, the work was systematized and performed under contract.

The question of the "yield" per acre is an equally interesting and important one.

A tummolo is equivalent to 5/18 of an acre and this equals 12,100 square feet. Allowing then 2½ square feet as the planting space for each plant, and a clear space of 7½ feet between each pit in one direction and 5½ feet clear space laterally, (an amount which is in excess of that which is allowed in the Bahamas, Yukatan, and Florida, the great centres of the sisal industry) a tumolo of ground would take about 170 to 180 plants. Mr. Stoddard in his report to the Government of Jamaica (vide Kew Bulletin) states that from 30 to 35 leaves per annum may be estimated for each plant and the Bahamian report states that 40 leaves may be cut annually from a mature plant. Each leaf weighs on an average 1½ lbs. so that one tummolo of ground would produce 180 multiplied by 40 multiplied by 1½ pounds which equals nearly 5 tons per annum. In Yukatan and the Bahamas it is estimated that 5 per cent. of this is fibre, so that one tummolo would produce 540 pounds of fibre and this at say £ 20 per ton (the price at the present time is considerably more) would represent an annual value of about £ 4. 16. 5 per tummolo.

Mr. Stuart in his recent report to the Bahama government says:—"The planters never speak doubtfully of their returns, as experience show them their crops can be relied upon with almost absolute certainty."

These are a few practical suggestions and hard facts. With these before us, and given the necessary energy and enterprise combined with a certain modicum of inventive genius on the part of our legislators, where, I would ask, are the difficulties that are to prevent the speedy establishment of the sisal industry in the Maltese Islands?

JOHN H. COOKE.

Notes and News

THE Editors desire those correspondents who have so kindly sent them such seasonable expressions of goodwill during the last week to accept their hearty thanks; and they trust that it will not be taken as an evidence of want of appreciation of the kindly wishes if they now adopt this general form of acknowledgment.

THE current issue of "*Natural Science*" is, as usual, brimful of interesting articles and news. Among others we note "High-Level Shelly-sands and Gravels" by T. Mellard Reade C. E., F.G.S. "Some Facts of Felegony" by Frank Finn F. Z. S., "Further notes on Arachnid and Insect Development" by G. H. Carpenter. B.Sc. "Notes on the Evolution of the Scales of Fishes" by A. Smith Woodward F. L. S. "The Sedgwick Museum Cambridge" by H. Woods B. A.. F. G S. and "Recent Explorations of the Maltese and Sicilian Caverns."

WE desire to call the attention of our readers to the "Special Notice" on the front page of the present number.

THE *limans* in the neighbourhood of Odessa, that is the salt water lakes on the shore which have already lost their connection with the sea, are sometimes seen to emit a phosphorescent light. This fact was especially striking during 1890-91. As the *Noctiluca-miliaris*, which renders the water of the Black Sea phosphorescent, does not inhabit the limans, their water was carefully investigated by M. Zabelotuyi who found that all the light is due to an infusorium *Glenodinium* (allied to *G. cintcum* from the *Peridinidæ*. It appears that it is the protoplasm of the little animal which emits light.

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CHESS.

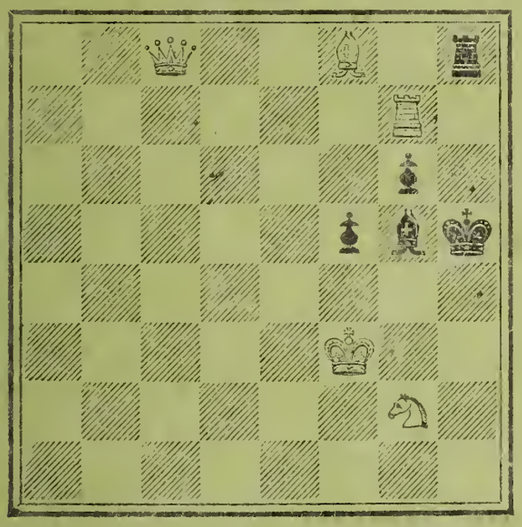
"Labor et constantia"

All communications connected with this column to be addressed to the editor of the Chess Column, 48, Strada Mercanti.

To Correspondets.

Solution of Problem No. 2 will be given in our next issue.

PROBLEM No. 3.
By W. Service.
Black.



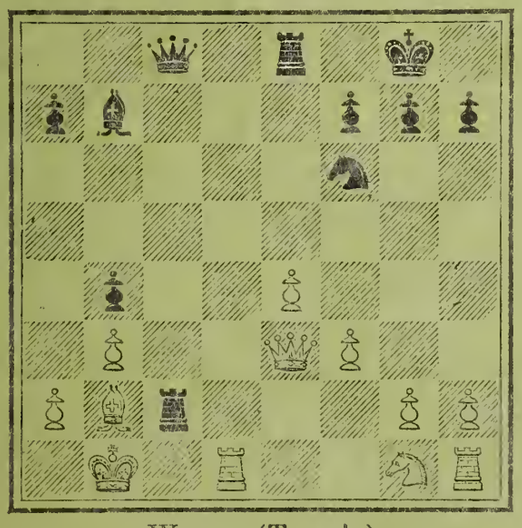
White.

White to play and mate in three moves.

Game ending.

The following pretty finish occurred in a handicap tourney of the Baltimore Chess Association:—

Black (Pollock.)



White (Torsch.)

Black played 1..., Kt×P; 2 P×Kt (Q to Q 4 was the proper move), B×P; 3 K to R sq, R×B!; 4 Q to B sq, R×P ch; 5 K×R, Q to R 3 ch; and mates next move.

CHESS IN CHINA.

(From a letter by Baron H. von. der Lasa)

—"The game of Chinese chess has never been the object of my researches, because it differs essentially from our game. A river crosses the chess board in the middle between the two players. The savant Freret, in a discourse on the origin of chess read or delivered by him at the Academy in 1729. at a *séance* in which the young King Louis XV participated says that the Chinese name chess the game of the elephant, and that they acknowledge having received it from the Indians. The Haipiene or great Chinese dictionary, states under the word Sianghki, that it was in the reign of Vouti, about the year 537 of J. C., that chess reached China. I do not know whether the Celestial Empire has its chess periodical, but I strongly doubt it. No Chinese word has to my knowledge been translated into a European tongue. I possess several Chinese treatises, but am ignorant of their contents Their diagrams, of which the books are partly composed, seem to be collections of problems. M. de Mollendorf says in his article that the game is more generally spread in China than is the case with chess in Europe, but that it is chiefly the popular classes that continuedly practise it, while it is lightly esteemed by the superior classes. The latter prefer an entirely different game 'Wei-Ch'i,' which they regard as older and more difficult. I believe this is the same game as that of the Japanese, known among the latter under the name of 'Go.'"

THE SHORTEST GAME ON RECORD.
Black giving the odds of K B P.
(Remove Black's K B P.

White.	Black.
Mr. Leeky.	Dr. Mason.
1 P to K 4	1 P to K Kt 4 *(a)*
2 Q to R 5 mate *(b)*	

Notes—*(a)*? *(b)*!

Played at Walpole house, Thorpe, Norwich.

White.	Black.
Mr. F.	Mr. I. O. Howard Taylor.
1 P to K B 4	1 P to K 3
2 P to K Kt 4	2 Q to R 5 mate

This game also occurred in a correspondence match in America.

Mr. Alex. S. Orr was the manipulator of the White men in the following game:—

White.	Black.
1 P to K 4	1 P to K Kt 4
2 Kt to Q B 3	2 P to K B 3
3 Q to R 5 mate	

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„ „ Brindisi	„ 17	„ 10	...	„ 25	„ 16
„ „ Alexandria	„ 20	„ 12	...	„ 32	„ 20
„ „ Port Said	„ 21	„ 13	...	„ 34	„ 21
„ „ Ismailia	„ 22	„ 14	...	„ 35	„ 22
Malta to Brindisi and Alexandria	„ 10	„ 7	...	„ 18	„ 12
„ „ Port Said	„ 11	„ 9	...	„ 19	„ 14
„ „ Ismailia	„ 12	„ 10	...	„ 20	„ 15
Naples to Malta	„ 4	„ 3	...	—	—
„ „ Alexandria	„ 11	„ 9	...	„ 19	„ 14
„ „ Port Said	„ 11	„ 9	...	„ 19	„ 14
„ „ Ismailia	„ 12	„ 10	...	„ 20	„ 15
Genoa to Malta	„ 6	„ 4	...	—	—
„ „ Alexandria	„ 12	„ 9. 10	...	„ 21	„ 15. 10.
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